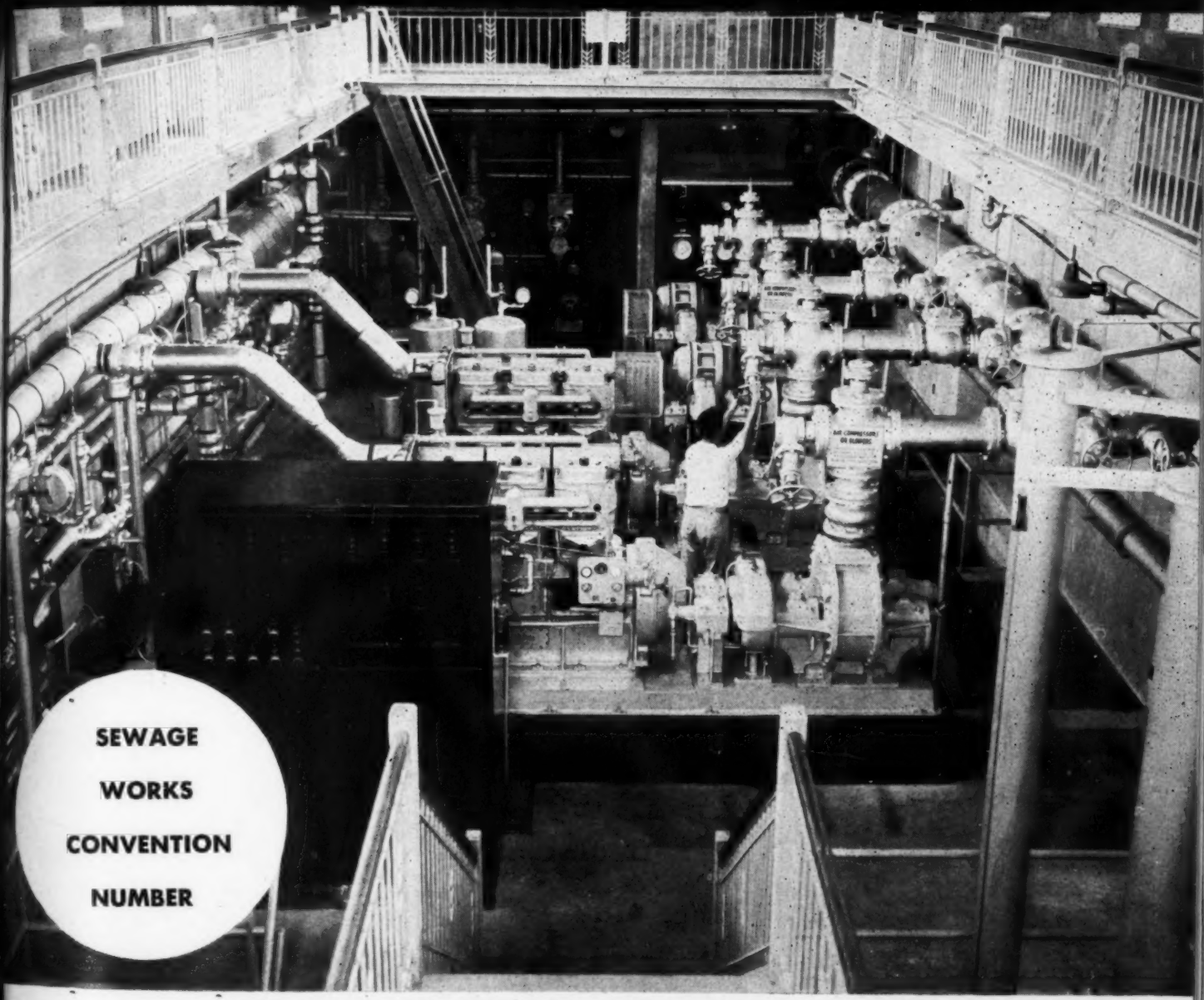
WATER WORKS & SEWERAGE



SEWAGE WORKS CONVENTION NUMBER

POWER HOUSE OF MARION, IND., SEWAGE TREATMENT WORKS

WANT QUICK DELIVERY!

Get CHAPMAN Standard

SLUICE GATES

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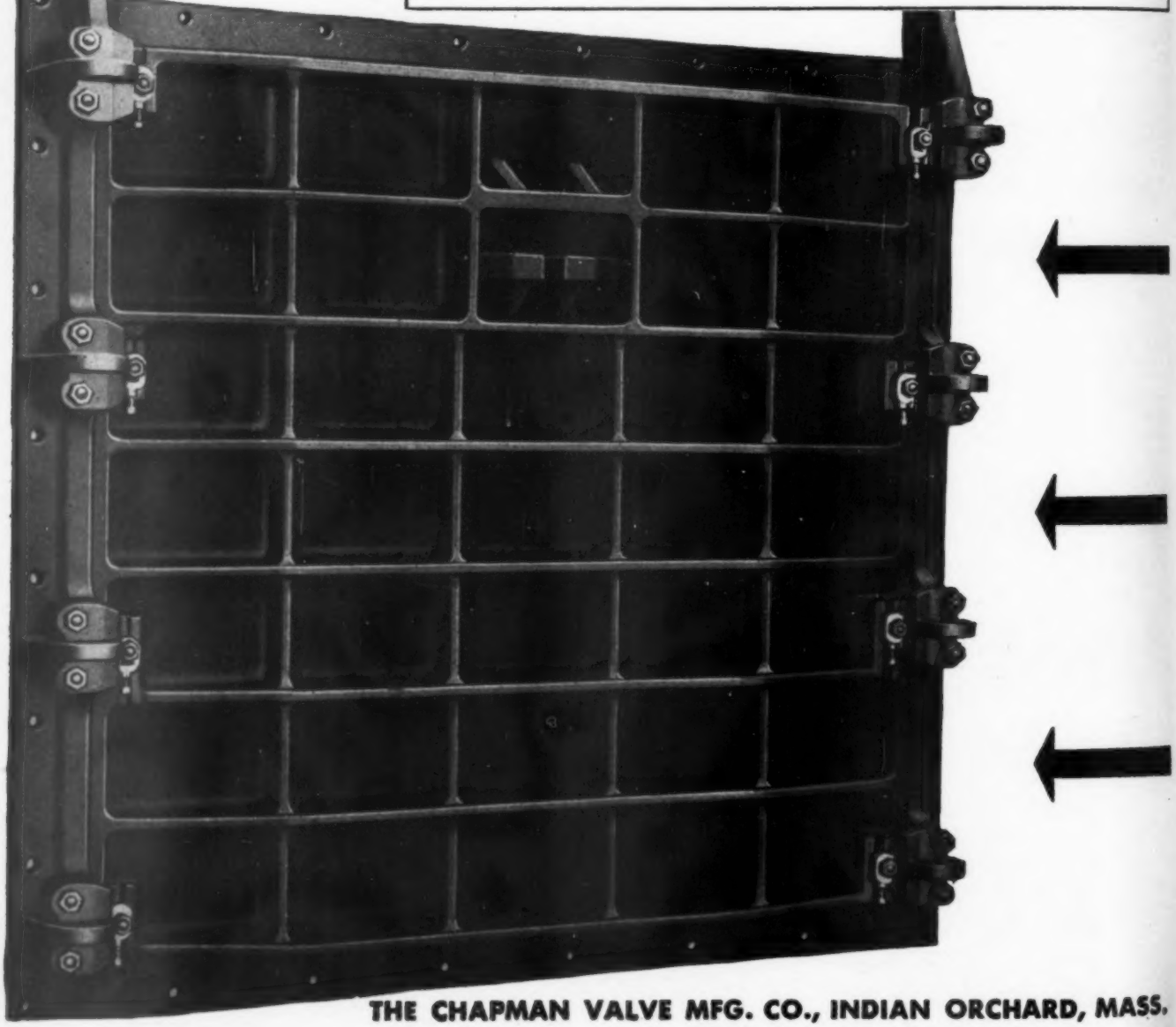
You get a wide choice of operating controls . . . manual, hydraulic, cylinder, or Motor Unit — Chapman has all types.

And get a copy of Chapman's Sluice Gate Handbook. It gives the complete story on sluice gates, dimensions and specifications. Write for it today!



THE CHAPMAN VALVE MFG. CO., INDIAN ORCHARD, MASS.

WATER WORKS & SEWERAGE, October, 1944, Volume 91, Number 10. Published monthly by Gillette Publishing Co., 330 South Wells Street, Chicago, Ill. Per copy, 25c. Subscription rate, United States, $2.00 per year; Canada, $2.00 per year; Foreign, $3.00 per year. Entered as Second Class Matter, June 2, 1931, at the Post Office at Chicago, Ill., under act of March 3, 1879.

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Your public works project will obviously be behind those set up at present; in respect to engineering, financing, bids from contractors, service and equipment from manufacturers. . . Being late will cause unavoidable delays and criticism of municipal officials.

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Don't let last-minute haste make waste. . . Detailed project will get preferred treatment, irrespective of how it is to be financed. . . Take advantage of the present availability of consulting engineers. . . Avoid placing yourself in position of trying to obtain the impossible.

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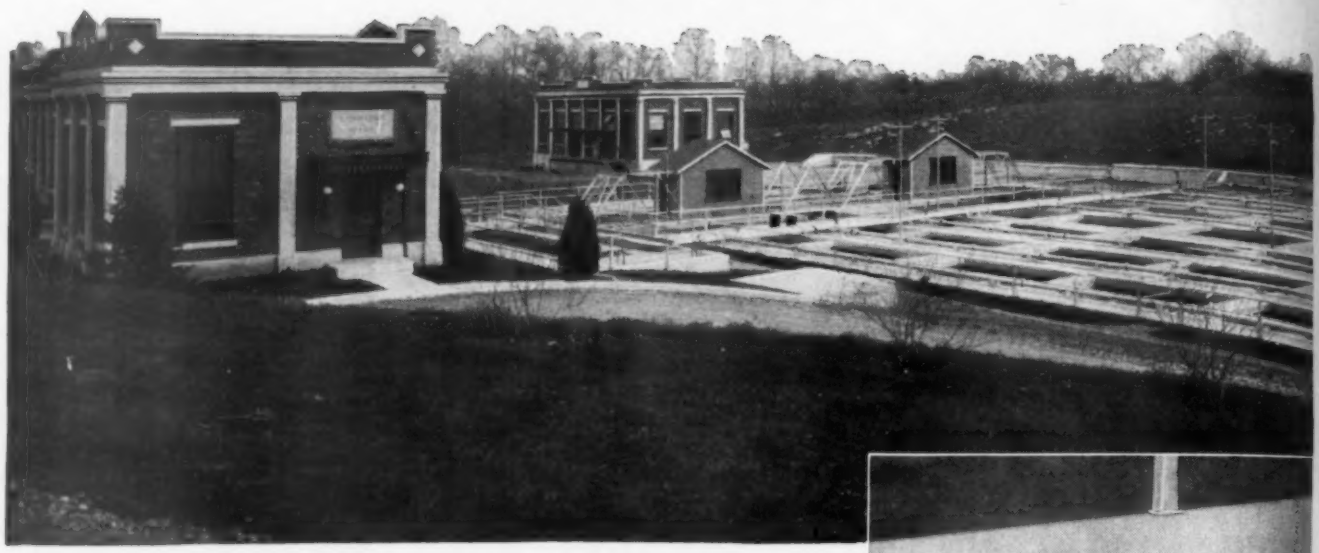
Flush-Kleen, Scru-Peller, Plunger, Horizontal and Vertical Non-Clogs, Water Seal Pumping Units, Samplers.

Swing Diffusers, Stationary Diffusers. Mechanical Aerators, Combination Aerator-Clarifiers, Comminuters.

AFTER 11 YEARS SERVICE

Everdur* Gates in Aeration Chambers still in excellent condition

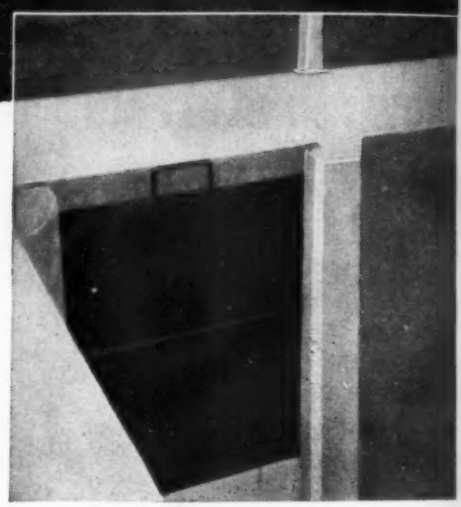
Engineers for Hagerstown plant, like many others, find Everdur ideal, for it is strong and highly resistant to corrosion



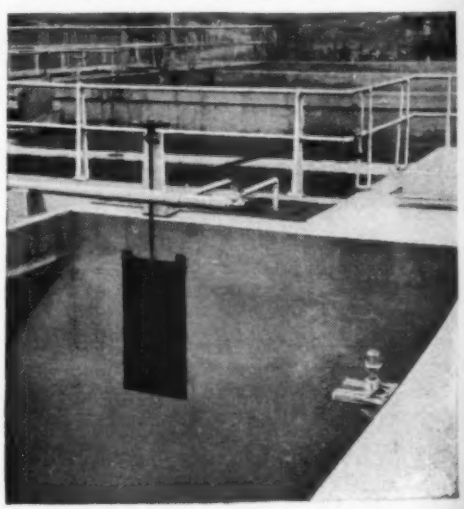
Hagerstown, Md., Sewage Disposal Plant where 14 Everdur gates and one Everdur weir plate have given many years of expense-free service. Fuller & McClintock, N. Y., Consulting Engineers. *J. B. Ferguson & Co., Hagerstown,* Contractors.

EVERDUR, a copper-silicon alloy, is unusually well adapted to lightweight, wrought, built up structures such as the hand- and stem-operated gates illustrated. It has been selected for a large number of projects because over a period of 16 years the superiority of the alloy has been demonstrated under a wide variety of operating conditions.

EVERDUR is rustproof and highly resistant to corrosion, possesses great strength and can be fabricated economically by all common methods. What's more, this valuable alloy is moderate in cost. A more complete explanation of its wide use, not only for gates but also screens, effluent and scum weirs, etc., will be found in Anaconda Publication E-11. Write for a copy—there's no obligation. 40139C



Hand-and stem-operated gates at the Hagerstown, Md., Sewage Disposal Plant.



ANACONDA **Everdur Metal**

*EVERDUR is a trade-mark of The American Brass Co., registered in the United States Pat. Off.

THE AMERICAN BRASS CO., General Offices: Waterbury 88, Conn.
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Here will be continued the important work of Penn Salt's rapidly growing staff of chemists, engineers and other technologists. With greatly enlarged facilities, they will be well-equipped to bear a substantial share of the increased responsibility imposed on industry by wartime's fast changing economy. Materials, not even dreamed of yesterday, already have become commonplace. And still more remarkable things are in store for the world of tomorrow.

This great building symbolizes the transformation that is taking place in the field of practical research.

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For more than sixty years The Jeffrey Manufacturing Company has specialized in the design and manufacture of material handling equipment of all kinds; and with this experience behind it, the Sanitary Engineering Division of The Jeffrey Manufacturing Company is fully qualified to offer complete technical information on equipment and plant design.

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Catalog No. 775

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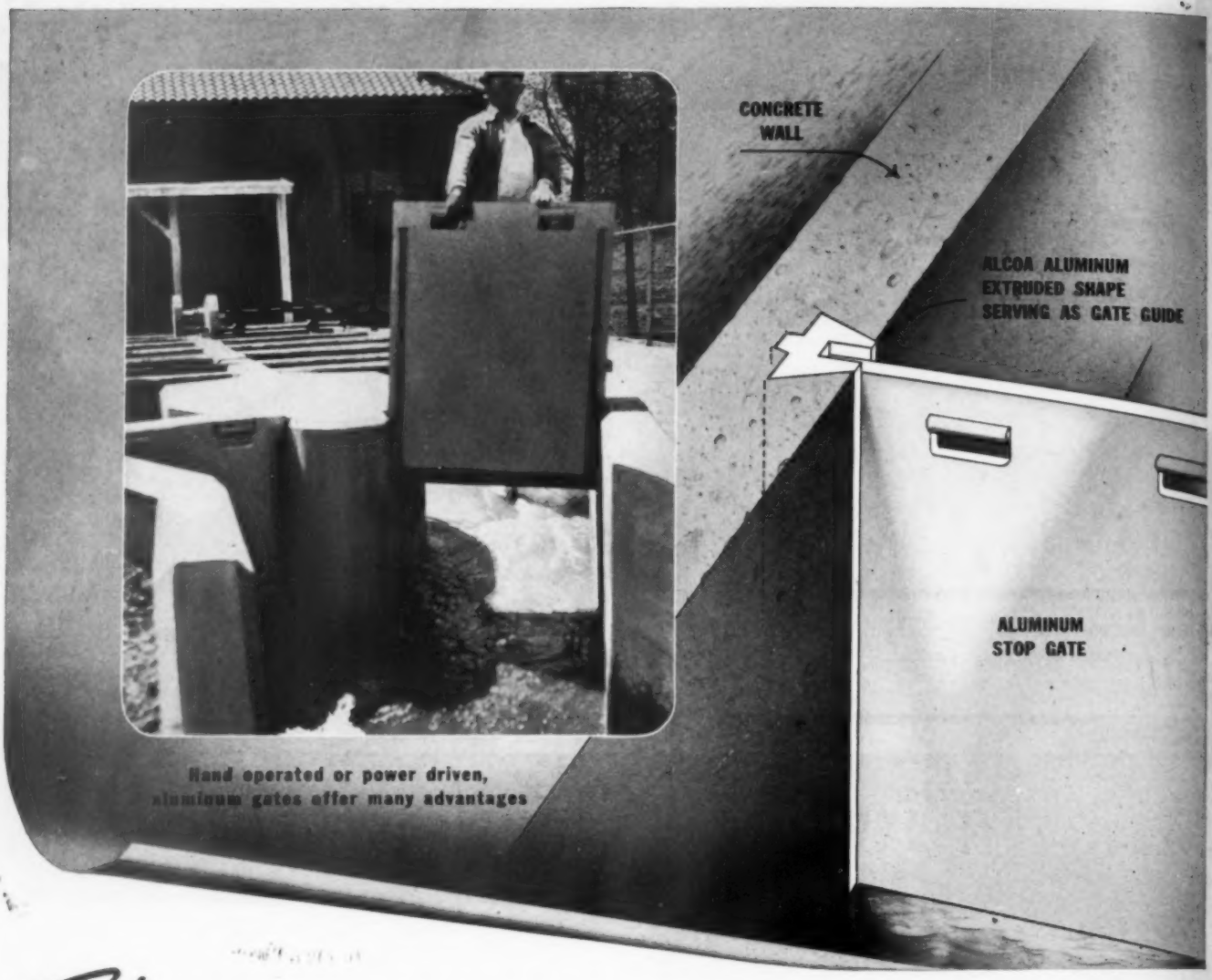
CONCRETE WALL
ALCOA ALUMINUM EXTRUDED SHAPE SERVING AS GATE GUIDE
ALUMINUM STOP GATE
Hand operated or power driven, aluminum gates offer many advantages

Aluminum GATES AND GUIDES TEAM UP TO EASE MANPOWER WORRIES

Hand operated or power driven, stop gates are much less a problem when aluminum's in the picture. With aluminum gates in aluminum guides, for example, there's no rusting to cause freezing of these parts. No scrambling for crowbars when an emergency shouts, "Open up in a hurry!"

Lighter weight aluminum gates require less power for opening, whether manpower or motor. They're popular with operating personnel. Aluminum's ability to resist corrosion assures longer life for equipment. It's popular with maintenance departments and with the men who pay for upkeep.

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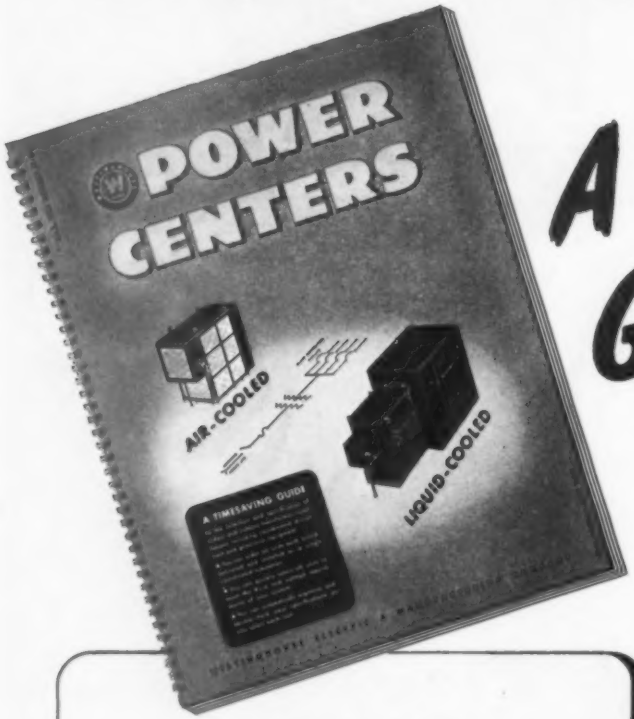

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Power Centers meet today's need for quick, convenient "packaged power" anywhere inside or outside the plant.

This handy selection guide enables you to order—and get—all units built, tested, delivered and installed as a single, co-ordinated substation just as you want it . . . ready to work. It shows clearly the choice of transformer, disconnect and protective arrangements that can be included in Power Centers for your type of distribution system. It enables you to specify quickly the correct units for your Kv-a and voltage needs. It automatically double-checks your specifications.

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- Selecting
- Specifying
- Ordering

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Represent 60 Years of Engineering and Manufacturing Leadership!

Since 1884, the name "Bean" has meant the finest in pest control equipment. Today, many thousands of Bean High-Pressure Sprayers are in use in every agricultural area throughout America and in many other parts of the world. The extraordinary designing, manufacturing and engineering "know how" gained through the building of Bean Sprayers and other FMC equipment, made possible the "*Water Buffalos*," the amazing amphibious tanks fighting with the Army and Navy. New and even better FMC equipment will serve the nation tomorrow.

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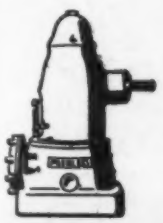
EXECUTIVE OFFICES: SAN JOSE, CALIF.

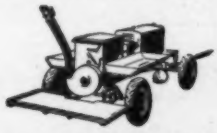
Bean Sprayers are manufactured by Bean-Cutler Division, San Jose, California and John Bean Mfg. Co. Division, Lansing, Michigan.

Other Typical FMC Products



PEERLESS PUMP DIVISION
Deep well turbines, hi-lifts & pumps handling water for all purposes. Los Angeles, Fresno, California; and Canton, Ohio.

Andersen-Barngrover Division Complete line of machinery for canning foods. San Jose, Calif.



Niagara Sprayer & Chemical Co. ... Insecticides for protecting crops from insects and diseases. Middleport, N.Y.; Jacksonville, Fla.; Burlington, Ont., Canada

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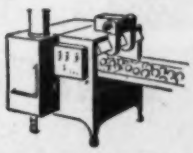
"Water Buffalo" amphibious tanks. 7 of Food Machinery Corporation's 14 major factories are making "Water Buffalos" or sub-assemblies.

Sprague-Sells Division. A complete line of food canning machinery. Hoopeston, Illinois.



Texas Division ... Food Protective Processes, Fruit & Vegetabl Packing Equipment, Canning Machinery. Harlingen, Texas.

These TYPE G-MV ANGLE Engines Must Not Fail

Entire water supply of giant Port Neches synthetic rubber project is pumped by two continuous-running Cooper-Bessemers

Pumping 250,000 gallons of water a minute . . . 360,000,000 gallons a day . . . these two 800 hp Type G-MV gas engines supply all the water used in the vast $45,000,000 rubber project at Port Neches.

Engine speed and pumping performance are accurately regulated by special Cooper-Bessemer automatic controls, so that exactly the desired water volume and pressure are maintained constantly. It is significant of the confidence placed in Cooper-Bessemer G-MV's that they must run continuously, day and night, without standby equipment.

Dependability and freedom from operating troubles are well-known Cooper-Bessemer qualities—proved by millions of horsepower working steadily for years in the oil fields, in refineries, natural gasoline plants, gas transmission stations and processing plants. No wonder men turn to Cooper-Bessemer whenever they need utmost reliability in an engine or compressor.

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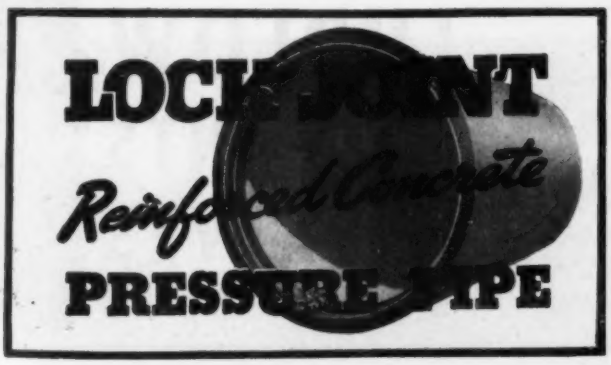
GIVE HIM PLENTY OF BIG JOBS TO DO

RIGHT NOW, on the home front, it's up to city officials and leading engineers to do their part in planning new municipal water mains and other public works projects. It's one way to have steady employment ready for local men when their present job is finished.

By specifying Lock Joint Reinforced Concrete Pressure Pipe for water supply lines, sewerage and drainage, you can fulfill your promise to your own returning men. For, the Lock Joint Pipe Company is prepared to come to your town, set up a temporary plant and employ 90% of local labor. As most of the supplies and materials will be purchased locally, there will be a direct benefit to your town merchants. As a result, a large proportion of the cost of the project will be spent right in your own community.

For more than three decades Lock Joint Pipe has played a vital part in the majority of large diameter water pipe contracts in the United States. When Victory comes, we stand ready to help you give your engineers, mechanics, carpenters, laborers and other skilled workers the jobs they will need.

Whether your project is large or small, for the present or the future, your 'phone call, telegram, cable or letter to any of our offices will bring a prompt reply.



LOCK JOINT PIPE COMPANY

Established 1905

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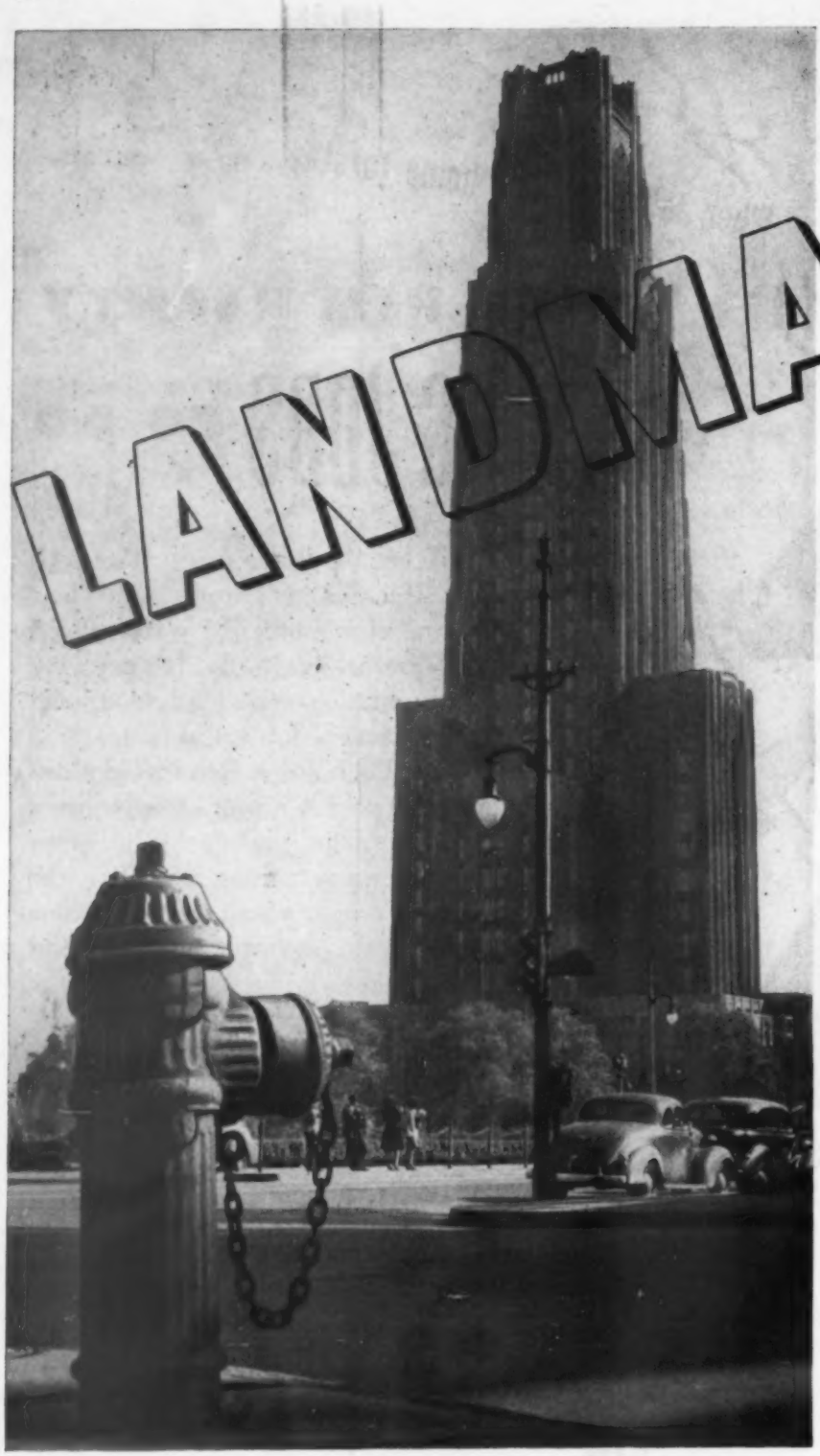
SCOPE OF SERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*



LANDMARKS

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and the new
share something
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built to last . . .
The Ludlow Hydrant,
old in service
but dependable as ever . . .
a symbol
of lasting security . . .
true Landmark
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You're interested . . . in quick water; proper shut-off without water hammer; correct drainage; easy inspection and servicing.
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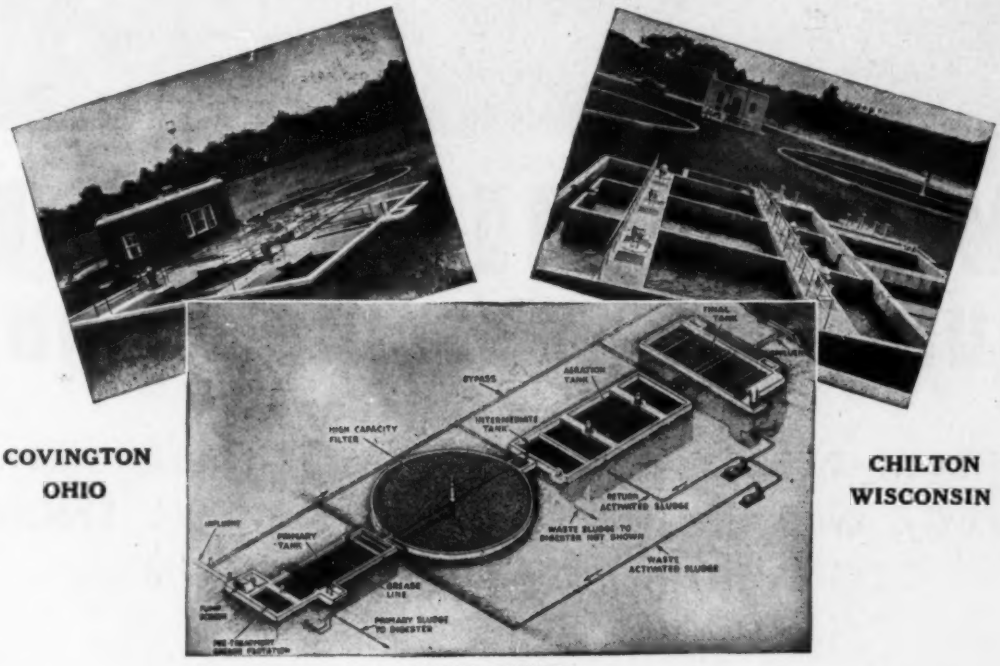
SINCE 1866

American Bio-Activation

WASTE TREATMENT



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Bio-Activation combines the best qualities of both the trickling filter and the activated sludge process to produce a completely stable, nitrified effluent, low in B. O. D. and suspended solids.

TYPICAL OPERATING RESULTS

	Domestic, Malt, Brewery and Canning Wastes	
	5 BOD	Suspended Solids
Raw Waste	342	370
Primary Effluent	235*	134
Influent to Filter	510†	.....
Filter Effluent	99	143
Intermediate Effluent	58	65
% Reduction Filter Influent through Intermediate Effluent	89.5	.....
Final Effluent	13	15
% Overall Removal	97.5	96

*High Soluble 5 BOD from malt and brewery.
†Pea waste; 600-1200 ppm. 5 BOD, added in primary effluent.

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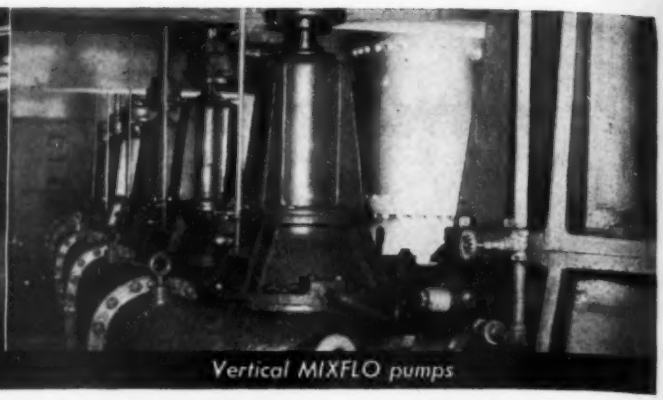
Sewage sludge gas engines



Vertical MIXFLO pumps

WORTHINGTON

EQUIPMENT *for* SEWAGE PLANTS

CENTRIFUGAL PUMPS

FOR RAW SEWAGE, SEWAGE SLUDGE AND GENERAL SERVICES

SEWAGE GAS ENGINES **DIESEL ENGINES**

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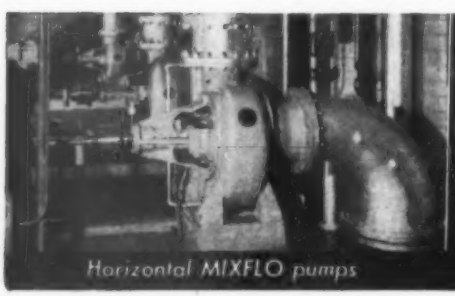
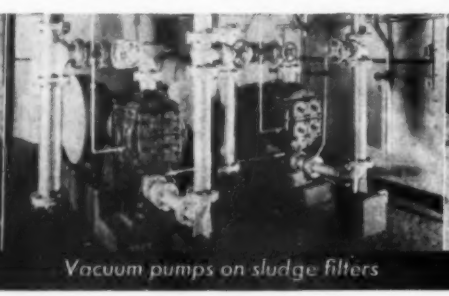
General Offices: HARRISON, NEW JERSEY

IC3-9



Horizontal MIXFLO pumps



Vacuum pumps on sludge filters

Portable compressors

BEFORE

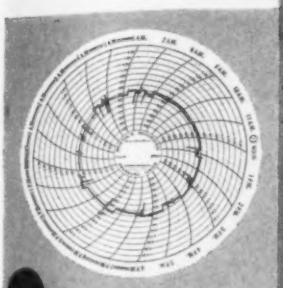
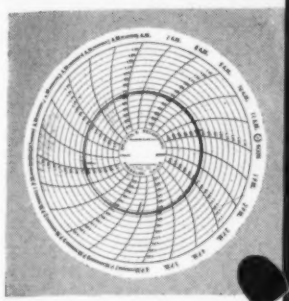
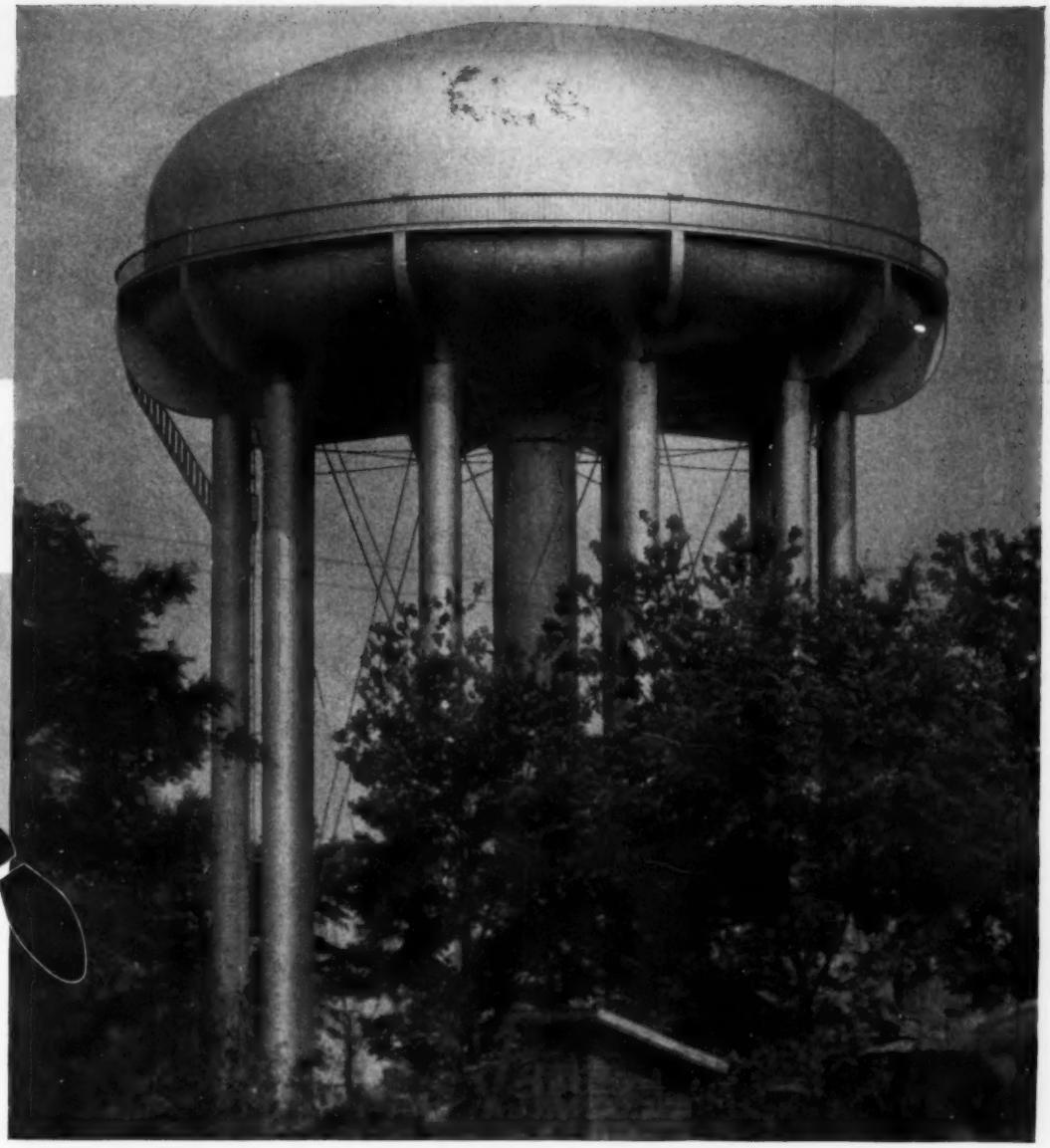


Chart above shows the pressure in the Dothan water system before the new tank was placed in service.



AFTER

This chart shows the pressure in the water system after the 750,000-gal. Horton elevated tank was placed in service.



...*the one step to take* to iron out pressure fluctuations in your water supply system

The story told by the two pressure charts shown above, at Dothan, Alabama, is a typical example of how Horton elevated storage tanks can iron out pressure fluctuations in a municipality's water supply system.

At the time of the installation of this 750,000-gal. Horton radial-cone bottom tank at Dothan, the requirements of cotton gin and oil mill operations threw a heavy demand on the municipally-operated power distribution system during the fall months. After the elevated tank was placed in service it was possible to keep the pumps shut down during the day and do all pumping at night. This enabled the city to realize a saving of approximately $185.00 per month for three months in the fall and a proportionate saving for the remaining months . . . in addition to ironing out the pressure fluctuations throughout the system.

Complete information and estimating data on Horton elevated tanks to meet your own requirements is available upon request. Please address our nearest office.

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New York 6.....3390-165 Broadway Bldg.
Cleveland 15.....2262 Guildhall Bldg.
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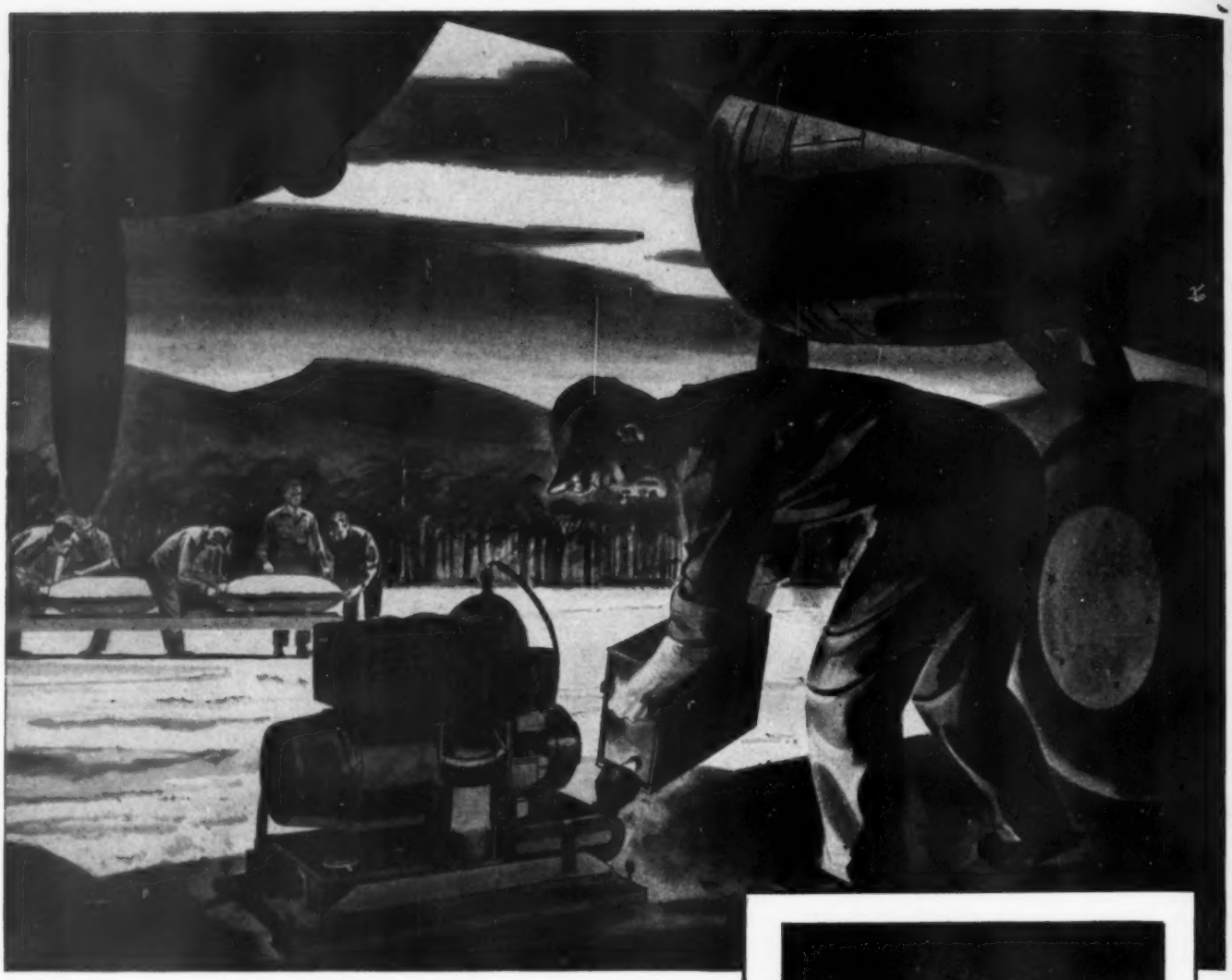
Philadelphia 3.....1644-1700 Walnut Street
Washington 5.....330 Bowen Bldg.
San Francisco 5.....1083 Rialto Bldg.
In Canada: Horton Steel Works, Limited, Fort Erie, Ont.



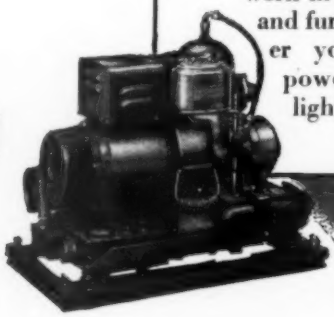
It eats the same grub as planes

And likes it! . . . Yes, a Homelite Portable Generator can be operated on high octane, highly leaded aviation gasoline. No special diet is necessary . . . even 100 octane gas, the fuel of planes, can't harm a Homelite's built-in gasoline engine.

The simple reason is this . . . the Homelite *two-cycle* engine has no exhaust valves to burn out. That's right . . . no valves to foul with lead or carbon . . . no valve seats to reface. Its only valve is a simple rotary valve that governs the flow of fuel.

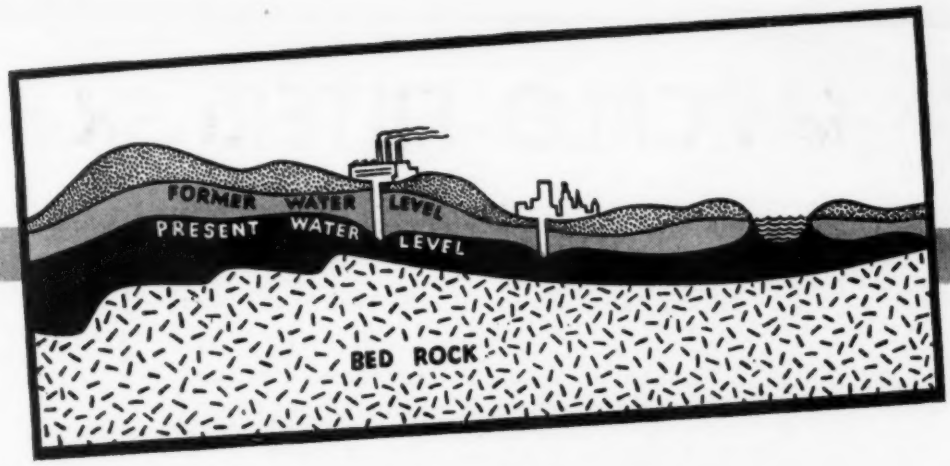
This, plus automatic voltage regulation, a lubrication system that supplies fresh, clean oil at each revolution, are some of the many reasons why thousands of rugged Homelite Portable Gasoline-engine-driven Generators are working in and around our military planes everywhere.

A Homelite Portable Generator isn't too fussy how you treat it or how you use it. Just give it some gasoline with a proper mixture of oil and it will work all day and night. It will work in rain, snow, sleet or heat and furnish all the electric power you need for operating powerful, flickerless floodlights or handy electric tools.



HOMELITE CORPORATION

PORT CHESTER, NEW YORK



AS THE WATER TABLE FALLS . . .

Accurate Metering of all main flows becomes a "must"

It is an alarming fact that more than half our public water systems are drawing from underground sources and through over-use and waste the water table is falling dangerously. Near the coast, wells begin to yield salt water; inland, the low water table may cut artesian well output in half. War industries are now drawing more heavily on underground reserves than ever before, but new process needs and air conditioning promise even greater drains in peacetime.

The available water supply must be conserved by reducing leakage and wastage to the minimum! Every main distribution line and every pump discharge line should have a Builders Venturi Meter, making available not only the total amount of water used day by day, but also continuous flow rate charts. These records reveal when and how much water is used and whether the system can be safely extended.

Builders Venturi Meters have been serving water systems for over fifty years. Into them are built the accuracy and endurance which have long made them the accepted standard of water works engineers and superintendents. Send for Bulletins 293C and 324A. Builders-Providence, Inc. (Division of Builders Iron Foundry), 9 Codding St., Providence 1, R. I.

BUILDERS
WATER AND SEWAGE WORKS
Equipment

←TYPE M INSTRUMENT totalizes, indicates and records flow through Venturi Tube.

↑VENTURI TUBE produces pressure differential to control the instrument.

Sincerely Yours
BUILDERS-PROVIDENCE

"BLUE PRINT NOW"

The ACCELO-FILTER *System*

RECIRCULATES

trickling filter effluent directly back to the filter inlet.

This ***Direct Recirculation*** brings these advantages and benefits to sewage plant operation and design–

(1) An Increased Biological Filter Efficiency
Direct return from filter effluent to filter influent keeps the aerobic organisms in the most favorable environment conducive to maximum bacterial development.

(2) No Clogging — No Sloughing — No Ponding
The continuous flushing action prevents excessive accumulations from developing in the interstices of the filter medium.

(3) Odor Nuisance Eliminated or Greatly Reduced
The continuous flushing action of direct recirculation removes biological gel before decomposition sets in.

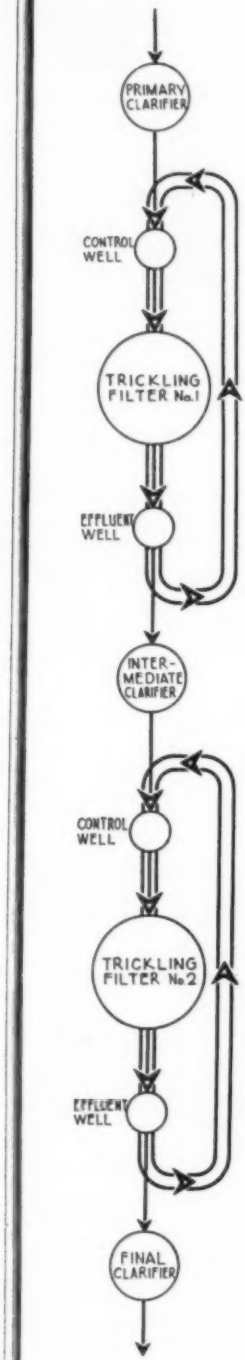
(4) Decreased Opportunity for Psychoda Fly Breeding
The continuous uniform dosing of direct recirculation keeps the surfaces of the filter medium wet thereby maintaining an environment unfavorable to the breeding of the psychoda fly.

(5) Increased Capacity for Overloaded Filters
Direct recirculation makes higher dosing rates possible thereby giving increased capacity to over-loaded existing conventional filters.

(6) Smaller Filters for Newly Designed Plants
Inclusion of the Accelo-Filter system in the design of new treatment plants permits the use of smaller filter units because of the higher dosing rates employed.

(7) No Increase in Size of Sedimentation Tanks
An exclusive feature of the Accelo-Filter System is that its inclusion in a plant layout does not necessitate the use of larger sedimentation tanks since none of the recirculated material reaches either the primary or final clarifiers.

Ask for Bulletin 2415



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INCORPORATED
325 W. 25th PLACE, CHICAGO 16, ILLINOIS

BE PREPARED!

concentrated sanitation ready for any emergency

This mobile chlorine carrier's 70% available chlorine swiftly restores sanitary conditions. It effectively destroys bacteria, objectionable odors and other contamination.

Packaged in 5-lb. cans, Sanitation HTH comes in handy for many every-day sanitation jobs, too. It's economical to use—dry and free-flowing. Use HTH for regular treatment of smaller water supplies, sewage effluents, and for efficient sanitizing of swimming pools.

Write for valuable 80-page handbook "Hypo-Chlorination of Water". Yours without charge.

Mathieson
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THE MATHIESON ALKALI WORKS (INC.) 60 EAST 42nd STREET, NEW YORK 17, N. Y.

SANITATION HTH..LIQUID CHLORINE..PH-PLUS..FUSED ALKALI..CAUSTIC SODA..SODA ASH..BICARBONATE OF SODA..BLEACHING POWDER
AMMONIA, ANHYDROUS & AQUA..DRY ICE..CARBONIC GAS..SYNTHETIC SALT CAKE..SODIUM CHLORITE PRODUCTS..SODIUM METHYLATE

IMPORTANT

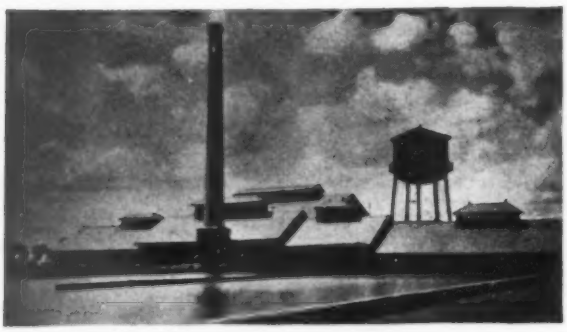
Public Health must be maintained!

The necessity of maintaining public health in war time is self-evident. Municipal officers in charge of water purification and sewage disposal have a vital responsibility in guarding the nation's health which should not be underestimated as a contributing factor to final victory.

However, the problems of maintaining public health are *becoming increasingly difficult in the face of material shortages and transportation handicaps.* General's "Alum" will help do the job right. But to ease the situation in regard to *Aluminum Sulfate* as much as possible, won't you place your orders as far ahead as you can so that we may schedule our production on an efficient basis.

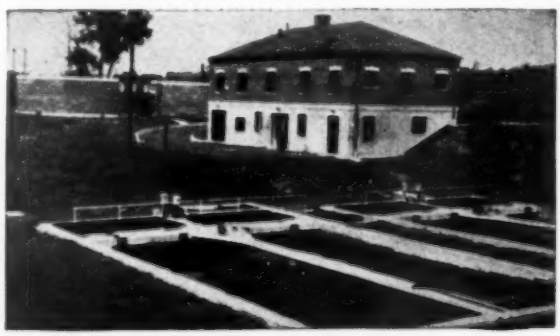
Why Most American Cities Prefer General Chemical Aluminum Sulfate

General Chemical Aluminum Sulfate is an especially developed "Alum." High quality and constant uniformity have given it a *time-tested* reputation among water works engineers and sewage plant operators, who know its reliability through experience.



★ FOR WATER WORKS

1. Makes water crystal clear.
2. Longer filter runs are obtainable.
3. Is economical, used properly will conserve chlorine supplies . . . because it does not require oxidation to make it effective.
4. Superior in tests against other coagulants.
5. High in quality, its constant uniformity can be counted upon.



★ FOR SEWAGE PLANTS

1. Clean, easy to handle and economical to use.
2. Simple application, requires only low cost feeding apparatus and minimum attention.
3. Clear, colorless effluents are possible.
4. Precipitated sludge digests readily.
5. Treated digested sludge dries quickly, without odor.

GENERAL CHEMICAL COMPANY

GENERAL CHEMICAL COMPANY

40 RECTOR STREET, NEW YORK 6, N. Y.

Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) • Buffalo • Charlotte (N.C.) Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Milwaukee • Minneapolis New York • Philadelphia • Pittsburgh • Providence (R. I.) • St. Louis • Utica (N. Y.)

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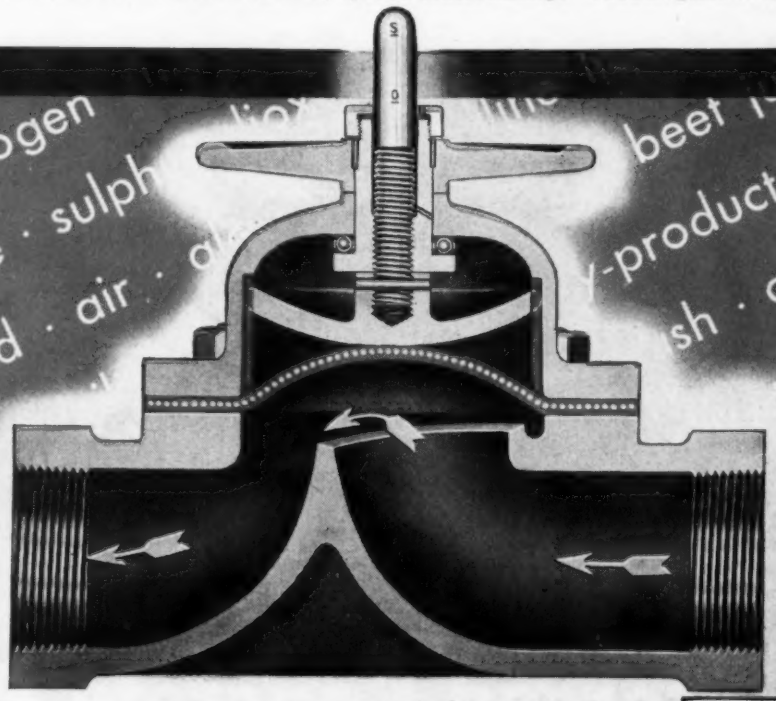
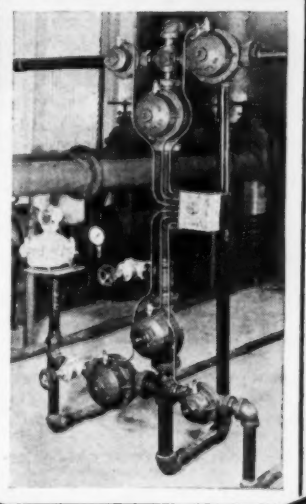
ANNOUNCING

The most practical valve for hard to handle liquids

1455 Diaphragm Valve, Screwed or Flanged. Pressures to 150 lbs., Temperatures to 150° F. Sizes from ½" to 6". Semi-steel body and bonnet, Stainless Steel stem. Non-ferrous bodies by special order. Linings—rubber, glass or lead.





Replaces more expensive valves in many services at substantial savings in initial cost and maintenance

McALEAR No. 1455 DIAPHRAGM VALVE—extensively used in chemical plants, mines, sewage disposal plants, water works, paint factories, paper mills, food processing and other industries—has proved practically indestructible in service with upwards of 100 different types of acids, alkalies, abrasives and suspended solids.

Can Not Leak

This valve requires *no reseating*—and *no leakage is possible*—because it does not depend on metal-to-metal contact for closure. Positive shut-off is provided by diaphragm *—even when solids are trapped on seat.* Shape of weir prevents accumulation of solids—offers minimum resistance to flow. Mechanism is trouble-free—*can not freeze* in outdoor service—requires *no repacking—no stuffing box,* because diaphragm completely separates fluids from working parts. Thus maintenance is minimized. The long-life diaphragm can easily be replaced without removing valve from line.

Installable in Any Position

Valve may be installed in horizontal or vertical position, below or above ground, with the hand wheel in any position, without danger of leaks. It is suited for on-or-off service where a tight shut-off is desired, or for throttling service within certain limitations. Special types, singly or in batteries, may be operated from remote points by air or water pressure controlled by automatic time clock, or pilot.

Photo shows pilot-operated No. 1455 Diaphragm Valves controlling flow rate during backwash and rinse cycles. For specifications, dimensional drawings, adaptations for pilot operation or remote control, and on linings suited for specific services, write for *McAlear Diaphragm Valve Bulletin,* McAlear Manufacturing Company, 1949 S. Western Ave., Chicago 8.

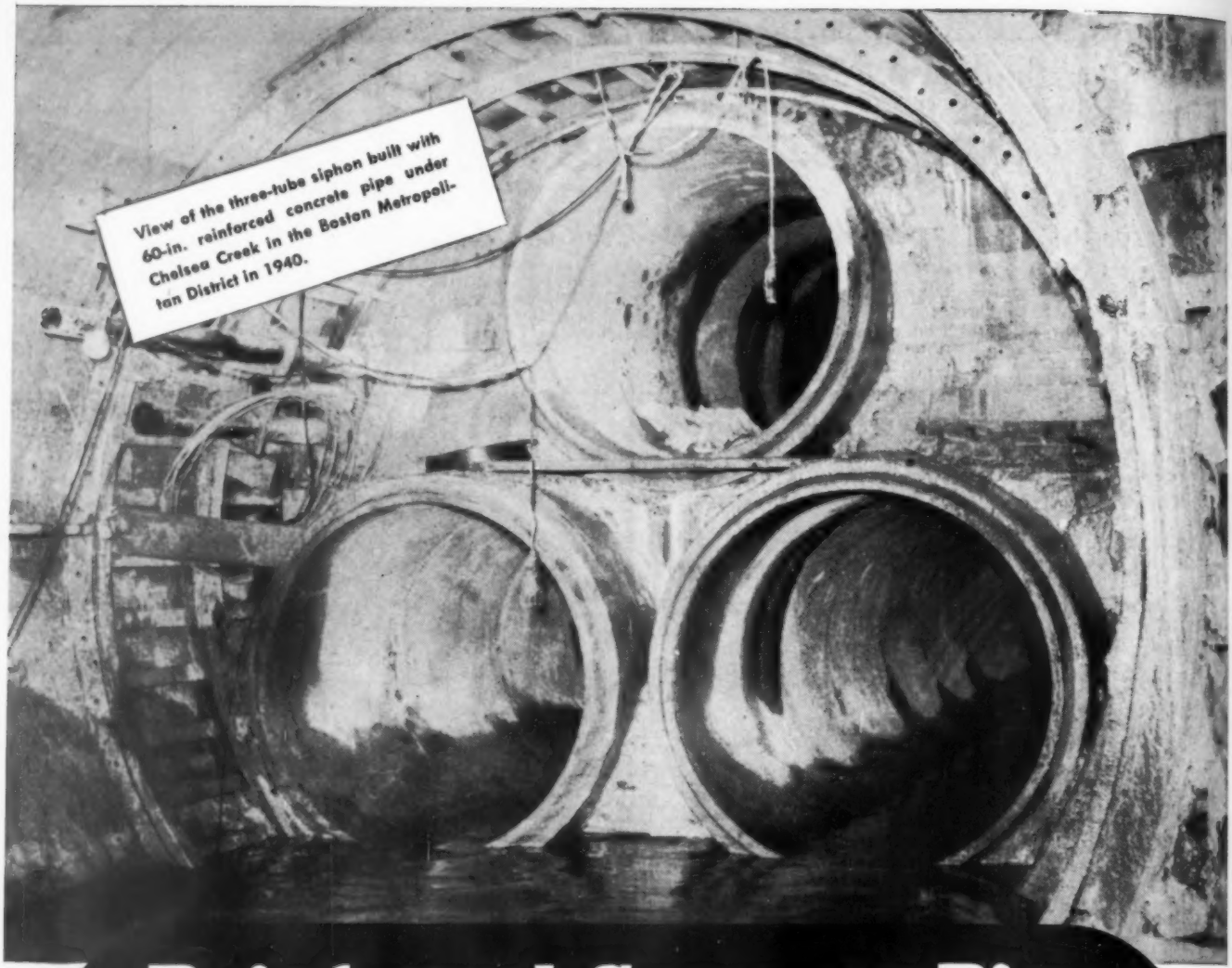
Affiliated with Hanlon-Waters Co., Tulsa; Climax Engineering Company, Clinton, Iowa.

H-W McALEAR controls

PRESSURE · FLOW · LIQUID LEVEL · TEMPERATURE

for STEAM, WATER, AIR, OIL—GAS

WELDED TANKS
BOLTED TANKS
SEPARATORS



View of the three-tube siphon built with 60-in. reinforced concrete pipe under Chelsea Creek in the Boston Metropolitan District in 1940.

Reinforced Concrete Pipe used for Sewage Siphon

To siphon sewage under a creek, a three-barrel siphon requiring 3,000 ft. of 60-in. reinforced concrete pipe was constructed at a depth of 50 ft. below mean tide by the Sewer Division, Metropolitan District Division, Boston, Massachusetts, in 1940. The cost of the improvement, including shafts and a circular reinforced concrete tunnel section, was $1,000,000.

When difficult and expensive sewerage problems are encountered, engineers use concrete pipe for the following reasons:

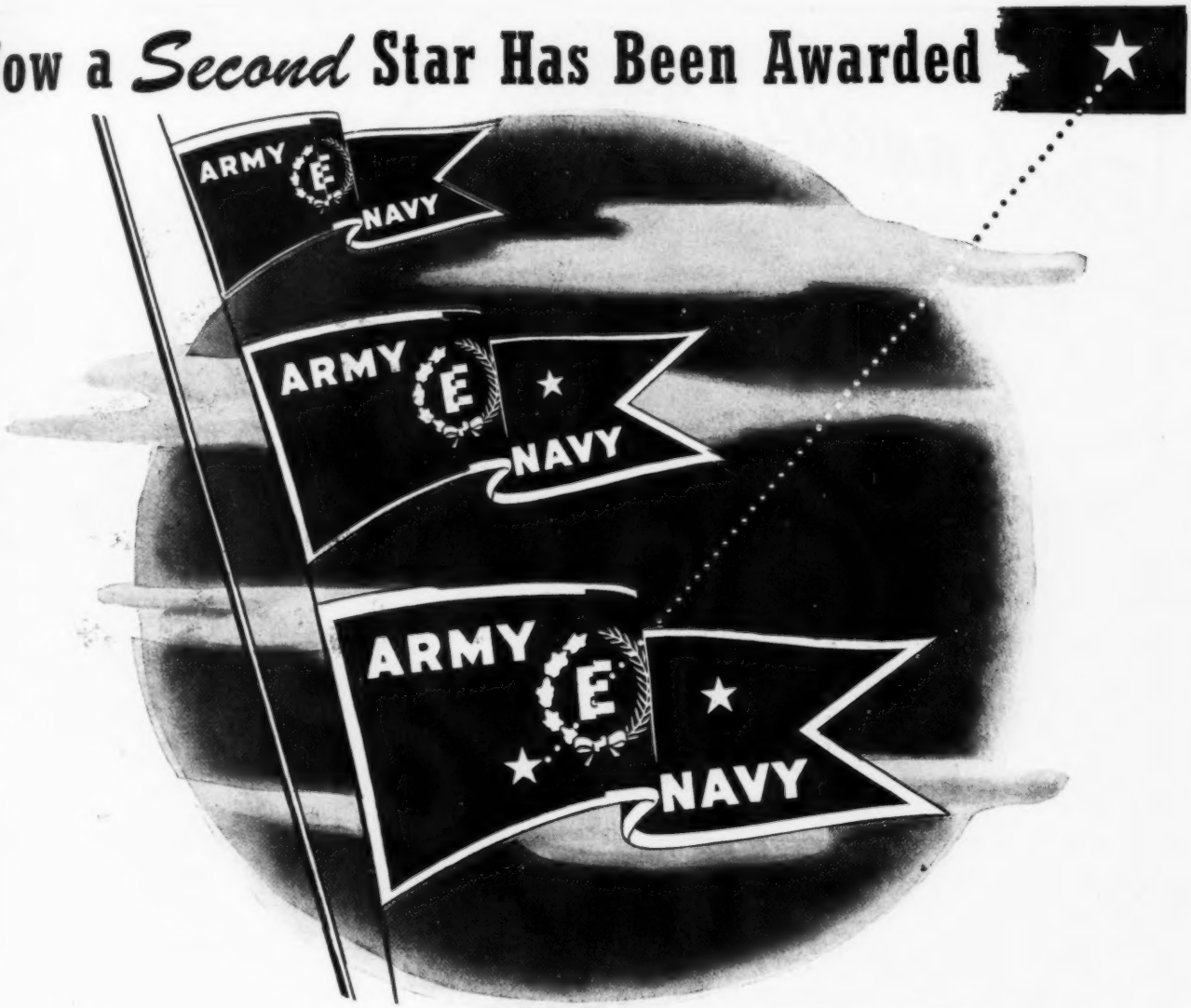
1. **Maximum structural strength when properly bedded and backfilled;**
2. **Maximum hydraulic capacity;**
3. **Joints made with portland cement mortar minimize leakage and infiltration;**
4. **Infinite life expectancy.**

When you design sewerage systems now and in the postwar period, specify concrete pipe complying with the tests and other provisions of the Standard Specifications of the American Society for Testing Materials and the American Association of State Highway Officials.

AMERICAN CONCRETE PIPE ASSOCIATION

33 West Grand Avenue, Chicago 10, Illinois • 342 Munsey Building, Washington 4, D. C.

Now a *Second* Star Has Been Awarded



THE loyal men and women of Badger Meter continue to back the attack with outstanding production of materials for war—keeping faith with their co-workers in the Armed Forces.

Now, with justifiable pride, Badger Meter workers point to the *second* star in their coveted Army-Navy "E" pennant that has flown over the Badger Meter plant since June 18, 1943 — fitting tribute to their loyal, outstanding achievement in war production.

The durability built into Badger Meters and the easy interchange of parts have enabled waterworks men to maintain Badger accuracy at commendably low cost. Government regulations now permit limited use of bronze for small meters. As more copper is released for bronze cases, Badger will be among the first to again offer its complete line of the finest water meters — unmatched in precision construction and durable materials — and in sustained accuracy at lowest operating cost.

BADGER METER MANUFACTURING COMPANY
MILWAUKEE, WISCONSIN

Branch Offices: New York City • Tampa, Fla. • Seattle, Wash. • Savannah, Ga. • Kansas City, Mo.
Marshalltown, Iowa • Waco, Texas • Los Angeles, Cal. • Chicago, Ill. • Philadelphia, Pa.

Back again!

BRONZE CASES

for

Worthington-Gamon Meters

...but Present Government Regulations Limit Use to Small Meters

WAR Production Board Limitation Order L-154 has been amended to permit the allocation of a limited amount of copper to the manufacture of bronze cases for water meters. Bronze will be used for Worthington-Gamon meter cases in 5/8" to 1" sizes only.

"Watch Dog" Quality Based on Longest Experience, Largest Research Facilities

The oldest water meter manufacturer, Worthington has constantly improved its broad line, to minimize maintenance, and at the same time measure ever smaller quantities dependably, accurately.

The Most Extensive Nation-Wide Service

Another reason why Worthington-Gamon Meters have been specified in the largest U. S. contracts: 24 district offices in 24 leading cities.

WORTHINGTON-GAMON METER COMPANY

282-296 South Street, Newark, New Jersey

WG4-6

Subsidiary of

WORTHINGTON PUMP AND MACHINERY CORPORATION

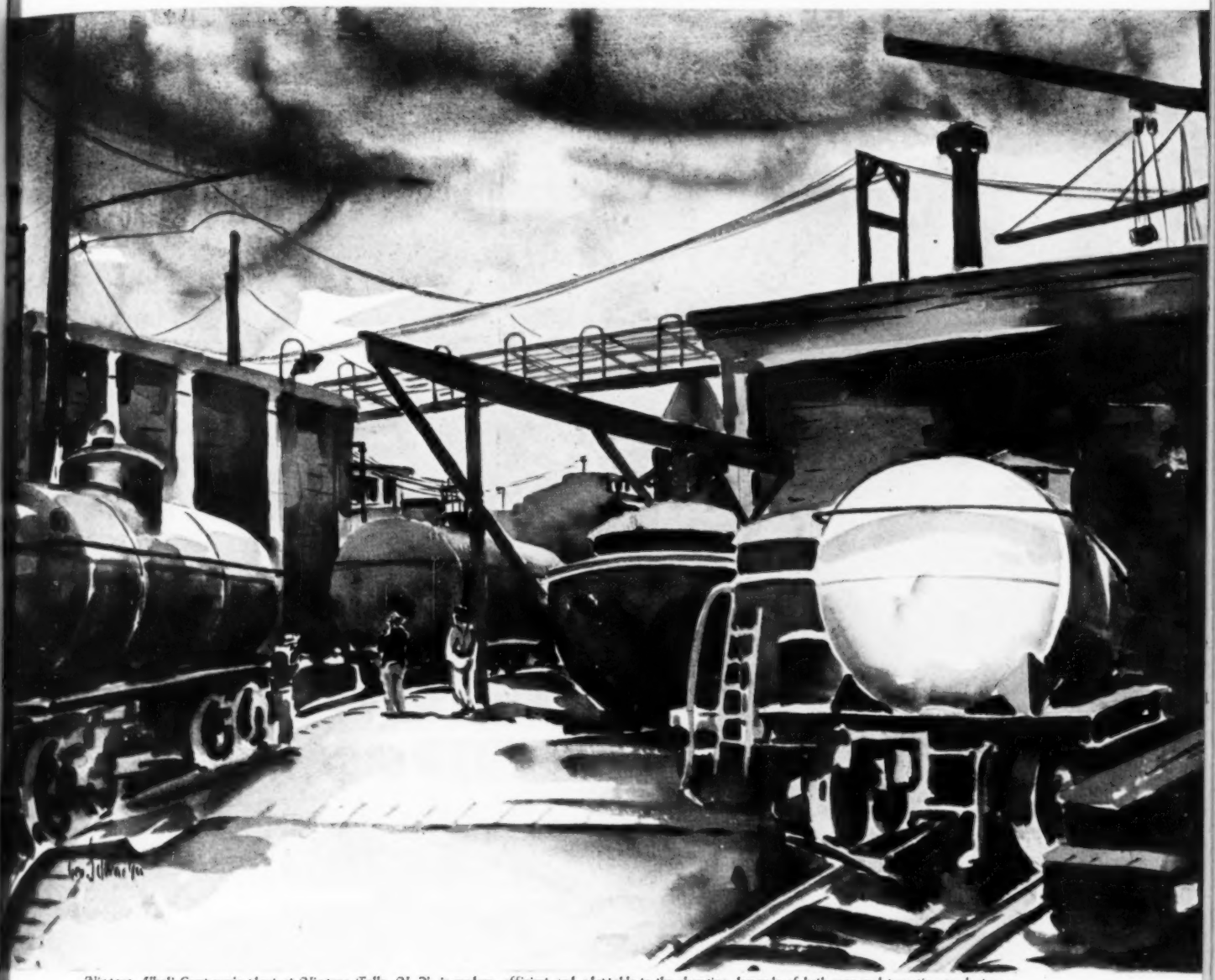
Power Plant Equipment • Turbines & Turbine-Generator Sets • Condensers, Heaters, Ejectors • Water Purification Equipment • Pumps, Stationary and Portable Compressors • Air Conditioning & Refrigerating Equipment • Power Transmission Equipment • Construction Machinery, Equipment for Mines • Locomotive Feedwater Heaters • Welding Positioning Equipment • Liquid Meters

WATCH DOG WATER METERS

The Meter Specified in the Largest Contracts Ever Awarded in the U. S.

"Watch Dog" models . . . made in standard capacities from 20 GPM up; frostproof or split case in household sizes. All parts interchangeable with your present meters of our manufacture. Write for Bulletin.

For a New Era...



Niagara Alkali Company's plant at Niagara Falls, N. Y. is modern, efficient and adaptable to the changing demands of both war and peacetime production

A THIRD of a century of pioneering experience in the manufacture of electro-chemical products has enabled Niagara Alkali to adjust and expand quickly and efficiently to the vast demands of war. And this same experience will serve in good stead when the time comes to apply the new war-inspired uses for these products to the expanding needs of the coming postwar era. In your plans for tomorrow you can rely on the proven quality of Niagara products and the skillful cooperation of Niagara's technical and research service.

Niagara ALKALI COMPANY

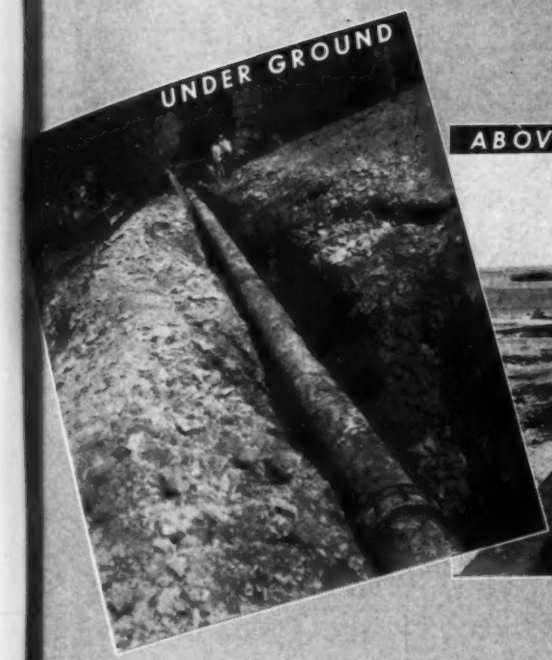
60 EAST 42nd STREET, NEW YORK 17, N. Y.

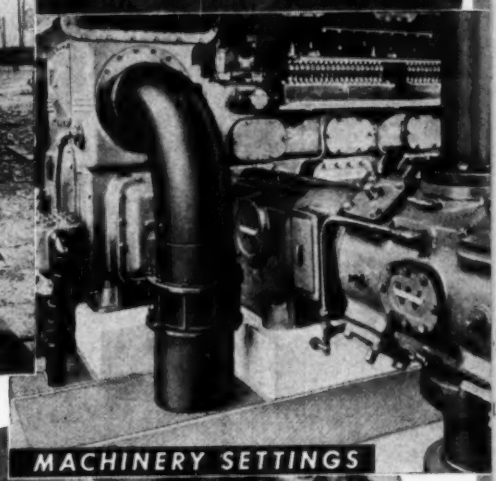
CAUSTIC POTASH • CAUSTIC SODA • PARADICHLOROBENZENE • CARBONATE OF POTASH • LIQUID CHLORINE

Caustic Potash · Caustic Soda · Liquid Chlorine

Paradichlorobenzene · Carbonate of Potash

A Few Feet of Service Pipe Or Pipe Lines Miles Long

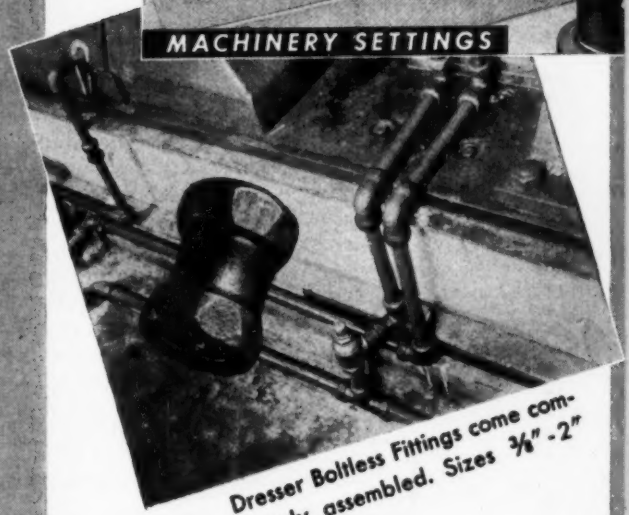




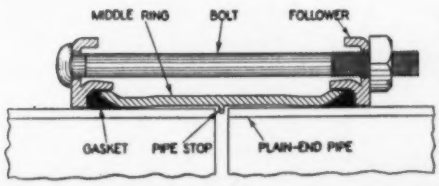
Call for Dresser Couplings for any pipe-joining job! Strong, compact, and ready-to-use, they make installation a fast, easy operation—even under difficult conditions. Expansion, contraction, deflection, vibration offer no hazard to their steady, trouble-free performance. "Dressers" stay permanently tight under internal or external pressure, or vacuum, and are readily demountable for re-use on temporary lines. Inquiries cordially invited.

Complete line of flexible Couplings, Fittings, Repair Clamps and Sleeves for practically all kinds and sizes of pipe.

Save Man Power with Dresser Couplings



Dresser Boltless Fittings come completely assembled. Sizes ⅜" - 2"



Working Principle—The flexible Dresser seal is effected by resilient gaskets compressed between metal rings and against the pipe by bolts.

In Canada: Dresser Manufacturing Co., Ltd., 60 Front St., West, Toronto, Ont.

DRESSER MANUFACTURING COMPANY

ONE OF THE DRESSER INDUSTRIES

BRADFORD, PENNSYLVANIA

How to feed a coagulant in WINTER!

As many a plant superintendent can testify, getting a coagulant into solution when tap water temperatures are low can be as tough a problem as trying to feed a balky two-year-old his dinner.

This chart, however, reveals a simple, effective answer, if the coagulant you use is Ferrisul, Monsanto's efficient, flexible anhydrous ferric sulfate. It shows how Ferrisul's natural heat of hydration can be used to speed mixing with water *whatever the temperature of your tap water.*

SIMPLY CHANGE FERRISUL : WATER RATIO

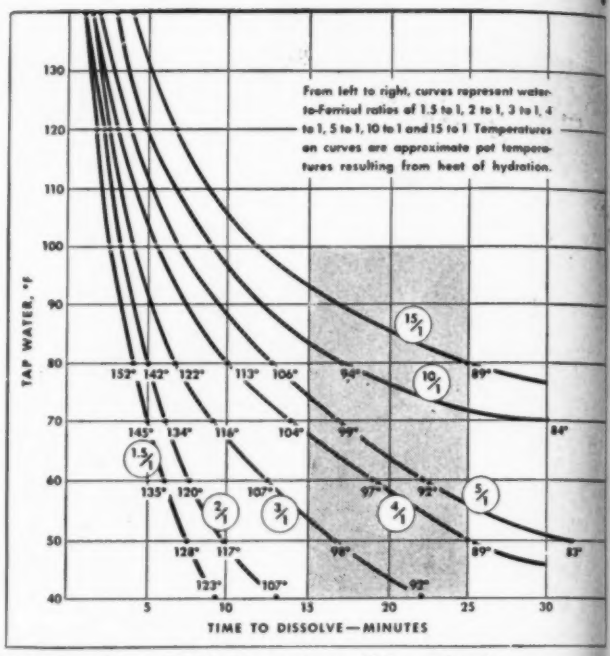
For example, if your tap water is 40°F., you can see from the chart that one part of Ferrisul added to three parts of water will raise the temperature in your mixing pot to 92°F. . . . *and the Ferrisul will be completely dissolved in about 22 minutes* (assuming, of course, that you provide good mechanical agitation).

On the other hand, if your tap water should rise in summer months even as high as 90°F., you can see that Ferrisul would still dissolve without difficulty if you simply increased the mixing ratio to 15 parts water to one part of Ferrisul.

Since Ferrisul is the only *anhydrous* ferric sulfate available for water and sewage treatment, it is the only such coagulant that creates heat when mixed with water and therefore the only one that can be completely dissolved in cold water by simply adjusting the ferric sulfate : water ratio.

OTHER IMPORTANT ADVANTAGES

Ferrisul is also the *only* commercial product which contains a minimum of 90% ferric sulfate, a particularly important point since the efficiency of any ferric sulfate coagulant is determined entirely by its ferric sulfate content.



These curves show: (1) what temperature will be produced in the mixing pot by seven different Ferrisul : water ratios as the temperature of the water added varies, and (2) how long it will take Ferrisul to dissolve in each of the seven ratios illustrated as the tap water temperature varies. For best results, it is recommended that Ferrisul : water ratios be changed as the temperature of your tap water changes so that mixing pot temperatures will always remain between 89° and 100°F. (shaded area). In this way, Ferrisul will always be completely dissolved in 15 to 25 minutes. For more details on Ferrisul dissolving and feeding, write for the new, four-page leaflet, "Feeding Data for Ferrisul."

Because its floc forms rapidly . . . settles quickly . . . and is effective over the entire pH range above 3.5 . . . Ferrisul handles wide seasonal variations in raw water and even wider *daily* variations in sewage with maximum efficiency and a minimum change in treatment.

To get started on plans for more efficient coagulation in your plant *now*, write *today*: MONSANTO CHEMICAL COMPANY, Merrimac Division, Everett Station, Boston 49, Massachusetts.

MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND

4MC-437

Air Operated Meters ★

"S" Flume Meters ★

Parschall Flume Meters ★

Special Chemical Feeders ★

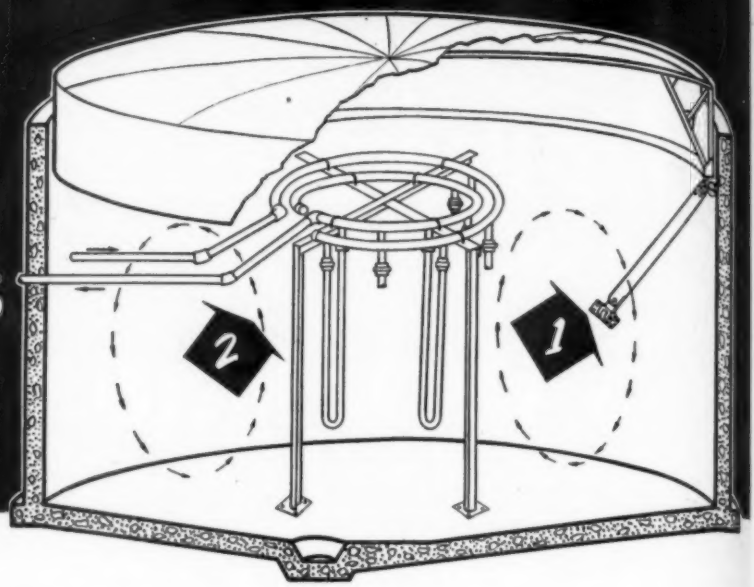
Ratio Devices ★

SIMPLEX VALVE & METER CO.
6743 UPLAND STREET, PHILADELPHIA 42, PENNA.

GRAVER

ANNOUNCES

2 IMPORTANT IMPROVEMENTS IN DIGESTERS



1

THE GRAVER STABILIZER

An entirely new method of support for the Digester cover which provides numerous advantages:

- **A.** Eliminates tilting and binding of cover.
- **B.** Equalizes eccentric loads.
- **C.** Makes high lifts possible without superstructure or wind bracing.
- **D.** Provides greatly improved appearance.
- **E.** Insures lower construction and maintenance costs.

2

THE GRAVER SECTIONAL HEATING SYSTEM

A revolutionary improvement insuring maximum efficiency and economy.

- **F.** One man can remove heating element without draining digester.
- **G.** Provides uniform heating from top to bottom.
- **H.** Light, removable sections.
- **I.** Repairs can be made without drawing off sludge.
- **J.** Uses standard replacement parts.
- **K.** Counter current flow.
- **L.** Improved convection current circulation.

These are but two of several important improvements ready for announcement by Graver. Get full details at the Graver booth, No. 55, when you attend the annual meeting of the Federation of Sewage Works Associations, Pittsburgh, October 12-14.

GRAVER

SEWAGE TREATMENT EQUIPMENT

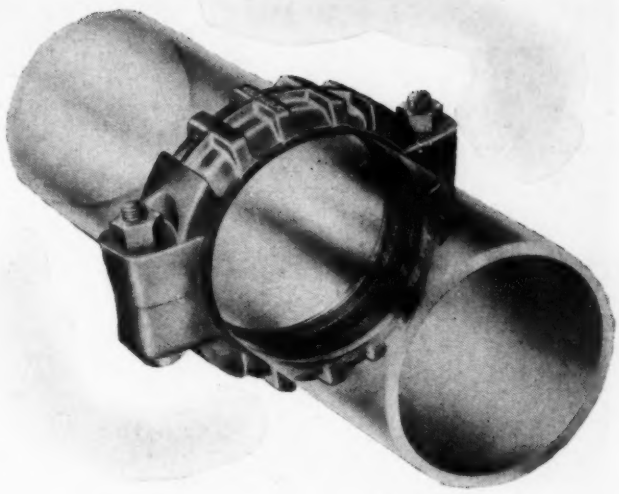
Process Equipment Division
of

4809-43 Tod Ave., East Chicago, Ind.

NEW YORK CATASAUQUA, PA. CHICAGO TULSA

Aerators — Chemical Treatment Plants — Clarifiers, Primary and Secondary — Coagulators — Digesters — Gas Holders — Rotary Distributors — Complete Sewage Treatment Plants

With nothing but a simple wrench



...plus Victaulic Couplings...

Even inexperienced men can connect as much as

30 MILES OF PIPE A DAY!

WAR BONDS
A PIPE LINE FROM
YOU TO HIM

Where time is worth money in industry...the speed and ease with which you can couple pipe by Victaulic really count in man-hours saved. There's no guesswork, no marking of pipe...Victaulic Couplings center automatically on pipe. Need for accurate alignment of pipe lengths is eliminated ...pipe lines can follow contours, curves, with a minimum of bends and fittings.

For full details on this leak-tight, mechanically locked flexible pipe coupling ...write for our new Victaulic Catalog and Engineering Manual . . . Address VICTAULIC COMPANY OF AMERICA, 30 Rockefeller Plaza, New York 20, N. Y. Other Victaulic offices—Victaulic Inc., 727 West 7th St., Los Angeles 14, California; Victaulic Co. of Canada, Ltd., 200 Bay St., Toronto.

THERE'S ONLY ONE

VICTAULIC

Reg. U. S. Pat. Off.

SELF-ALIGNING PIPE COUPLINGS AND FULL-FLOW FITTINGS

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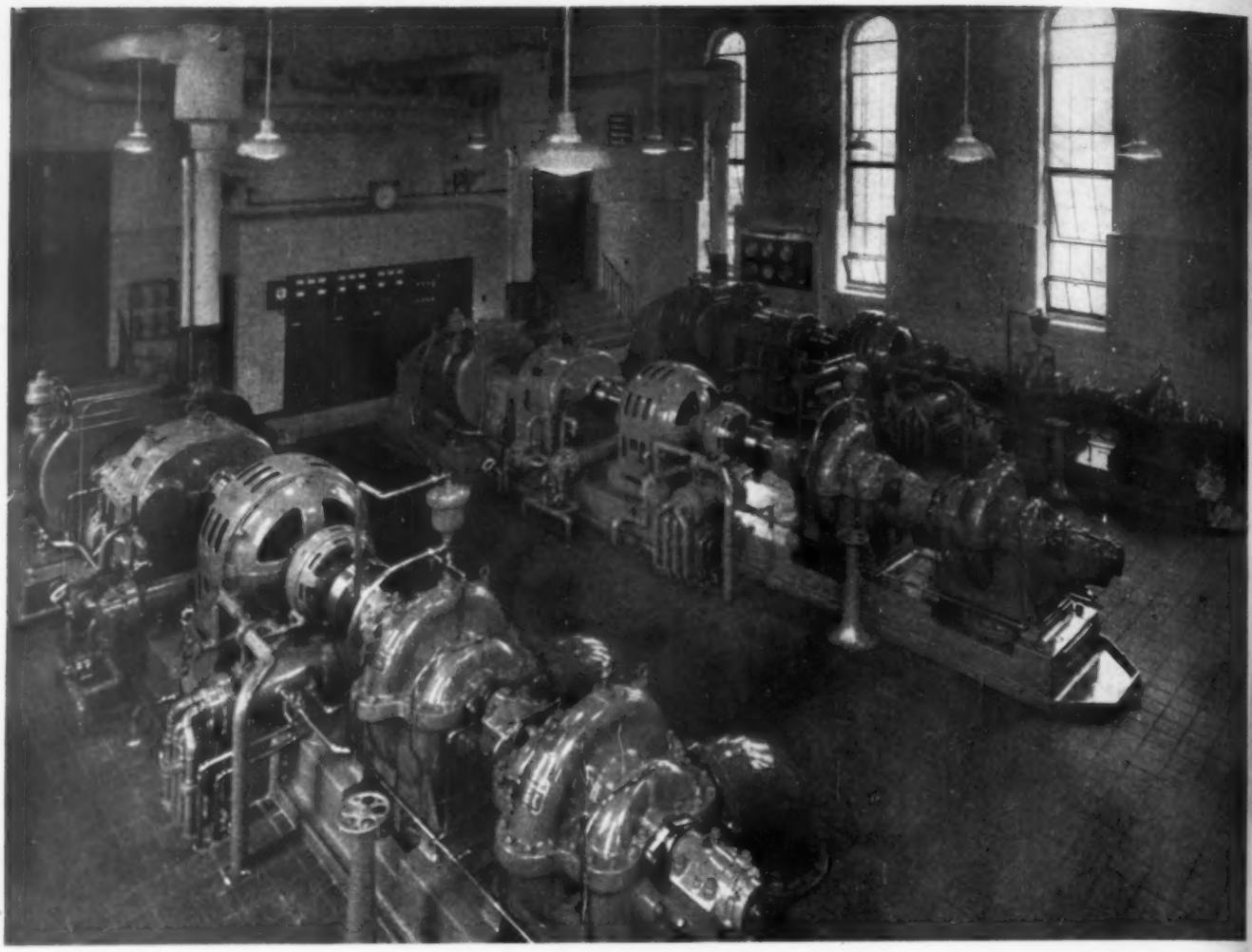
OIL MINING MARINE MUNICIPAL INDUSTRIAL



NEWTON, MASS.—3 De Laval geared turbine units. 4¼ m.g.d., 272 ft. —6 m.g.d., 325 ft.—8 m.g.d., 370 ft. Each with 250 Kva 4000 volt generator

ANOTHER EXAMPLE OF

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In 1932 the City of Newton, Mass., planned for removal of old vertical pumping engines and replacement with three geared turbine driven pumping and generating units including condensers, steam, water and lubricating oil piping, oil purification, control switchboard and station wiring.

One contract for all of this equipment completely installed was awarded to Turbine Equipment Company of New England.

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- *Fast Installation.*
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Complete information is given in brochure TR-21A. And for details on lower-cost water transportation, send for Transite Water Pipe Brochure TR-11A. Johns-Manville, 22 East 40th Street, New York 16, N. Y.

ENGINEERING DATA

GRAVITY TYPE

Sizes: Class 1— 4" to 36"
Class 2—10" to 36"
Class 3—10" to 36"
Class 4—18" to 36"

●

PRESSURE TYPE

Sizes: 3" to 36"

Pressure classes:
Class 50— 50 lbs. per sq. in.
Class 100—100 lbs. per sq. in.
Class 150—150 lbs. per sq. in.
Class 200—200 lbs. per sq. in.

Friction Coefficient
(Williams & Hazen): C-140

Crushing Strengths:
A.S.T.M. 3-edge bearing test method

Pipe size inches	Lb. per linear ft. Class 1	Class 2	Class 3	Class 4
4	4125	....	....	....
5	3350	....	....	....
6	2880	....	....	....
8	3100	....	....	....
10	2580	3690	4920	....
12	2370	3850	5100	....
14	2200	3920	5150	....
16	2120	4050	5280	....
18	2030	4140	5360	6340
20	2290	4280	5850	7100
24	2340	4550	7050	8600
30	2980	5000	8180	10450
36	3500	5400	9700	12300

Friction Coefficient (Kutter's); n=.010

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SEWER
PIPE
An Asbestos Product

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Official Photos U. S. Navy and U. S. Marine Corps

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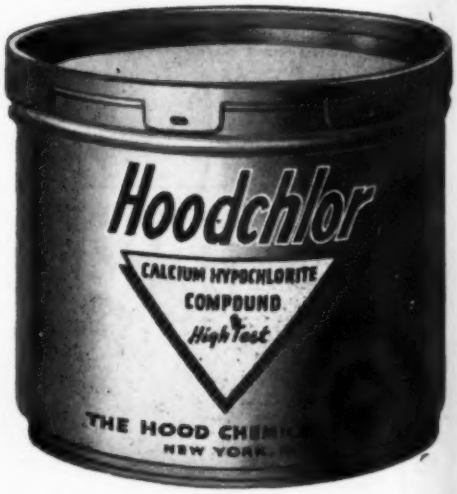
HOODCHLOR is now shipped in convenient resealable steel pails, lined with chlorine resistant lacquer. Net weight 25 pounds.



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Factory: Akron, Ohio

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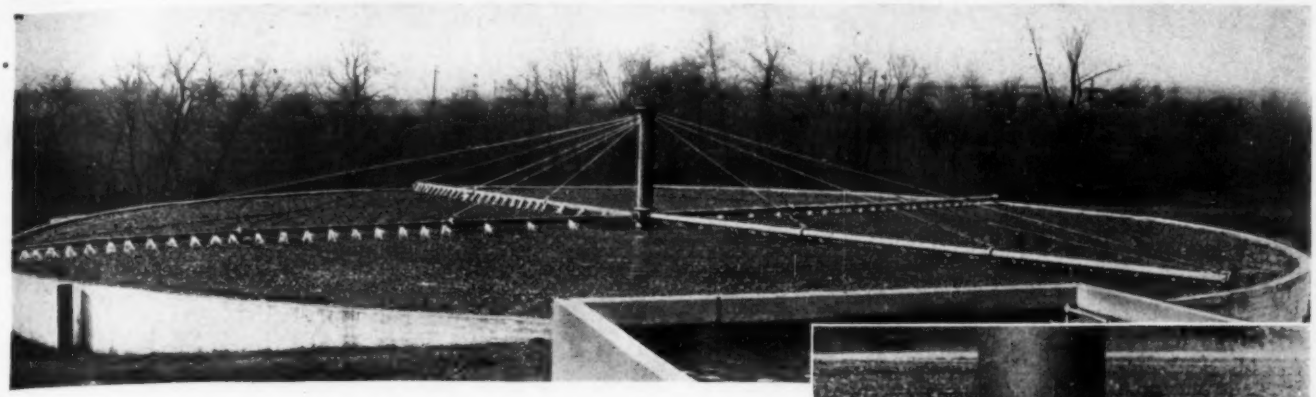

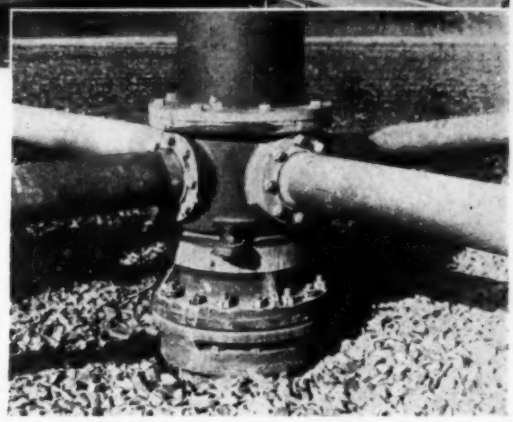

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CARTER REACTION TYPE
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For Trickling Filter System of Biological Treatment

The Trickling Filter Method of secondary treatment, recognized as one of the most successful means of sewage purification, will equal, and in some cases surpass the performance of more costly and complicated installations. Its advantages include:

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- Oversize ball bearings
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- Correctly engineered distributing arms, fitted with bronze discharge nozzles

CONSULT US ON ANY PROBLEM

. . . in the field of mechanical equipment for Sewage Treatment and Water Purification. We have specialized in these fields for more than forty-one years, and the experience of our Engineering Department may save you considerable time and money in meeting your specific requirements.

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- Welded construction and standard parts—the better to meet such field emergencies as may arise
- Annular chamber, with ample capacity to admit addition of such extra mercury as would be required in change-over from standard dosing siphon to direct pump type feed
- Adequate lubrication capacity
- Extra heavy steel guy rods, equipped with turn-buckles for correct distributor arm alignment

Further details of the CARTER ROTARY DISTRIBUTOR are given in our Bulletin WS-4401, which will be mailed upon request.

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Consumer Complaints?

When water consumers complain, it's time to use Aqua Nuchar Activated Carbon.

One of the many demands of taxpayers is that you deliver clear, pure and *palatable* drinking water. Yes, this is being accomplished by hundreds of cities and towns throughout the country by the use of Aqua Nuchar Activated Carbon.

Every waterworks official knows that all surface water supplies are subject to bad tastes and odors due to algae or pollution from industrial wastes and that the degree of pollution varies widely from day to day. Pollution from war industries has greatly increased and there is a strong tendency to increase more.

Wise waterworks operators use Aqua Nuchar Activated Carbon to remove all tastes and odors that cause consumer complaints.

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But above all, remember there is a war yet to be won. Maintain equipment to assure operation at 100% efficiency.

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NO TUBERCULATION TO CHOKE OFF THE HIGH FLOW-RATE of TRANSITE PIPE!

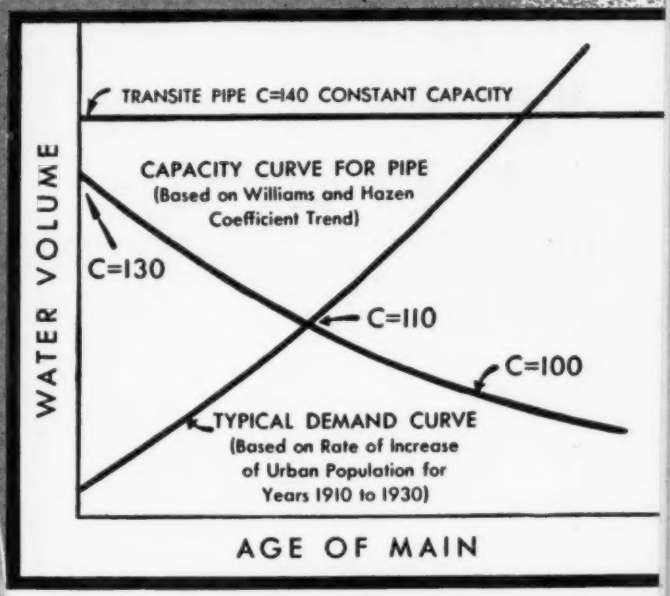
TRANSITE PIPE C=140 CONSTANT CAPACITY
CAPACITY CURVE FOR PIPE
(Based on Williams and Hazen Coefficient Trend)
C=130
C=110
C=100
TYPICAL DEMAND CURVE
(Based on Rate of Increase of Urban Population for Years 1910 to 1930)
WATER VOLUME
AGE OF MAIN

Chart shows how high initial flow rate combined with maintained carrying capacity account for one of the important advantages gained through the use of Transite Pipe.

HERE'S a pipe whose delivery capacity can never be affected by tuberculation. Johns-Manville Transite Pipe has this valuable advantage because it's non-metallic, being made of asbestos and cement.

In addition, Transite Pipe has a smooth, close-grained interior surface that offers less resistance to water-flow, resulting in an unusually high initial flow rate.

Other advantages you get with J-M Transite Pipe are rapid, simple assembly and tight, flexible joints because of the Simplex Couplings; and easy handling due to its light weight.

* * *

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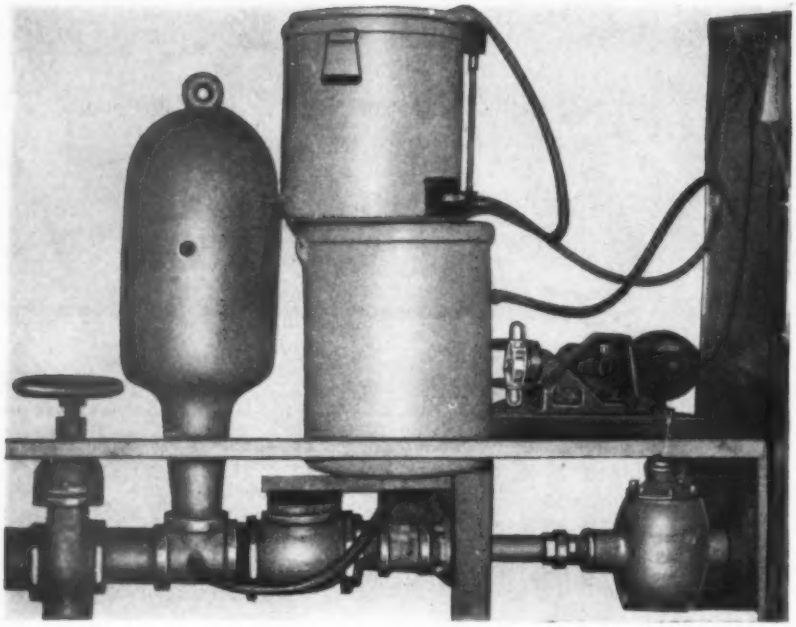
JM JOHNS MANVILLE PRODUCTS

Johns-Manville TRANSITE PIPE

An asbestos product for efficient, economical water and sewer lines

Bathroom Windows No Longer Open...



Thanks to %PROPORTIONEERS%

In one of our north central states a small town was troubled by hydrogen sulphide odors as well as the questionable quality of one of their soft water well supplies. Frequent flushing of mains was necessary and consumers were forced to open bathroom and laundry windows when drawing large quantities of this water.

On decision of the City Council and Superintendent, a %Proportioneers% Heavy Duty Midget Chlor-O-Feeder was installed as shown. For automatic operation, the Chlor-O-Feeder drive motor is cross-connected to well pump motor starting switch. Two ounces of available chlorine are mixed with each 3 gallons of water in 15 gallon crock, and then after settling, clear solution is drawn off into 20 gallon feed tank. 3 to 4 PPM dosage with Midget Chlor-O-Feeder produces 0.3 PPM residual 1,000 ft. from well. Thanks to %Proportioneers%, water from this well with the addition of hypochlorite is now free from odor and safe for drinking.

Perhaps conditions are not so embarrassing in your town, but if you have a problem requiring chlorination for safety or odor control, write us today. We will gladly make recommendations.

% PROPORTIONEERS, INC. %

"Chemical Feeder Headquarters"

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WATER WORKS & SEWERAGE

PUBLICATION OFFICE
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E. S. Gillette, Publisher

EDITORIAL OFFICE
155 East 44th Street, New York, N. Y.
L. H. Enslow, Editor

COMING!

The Value of Sewage Treatment Plant Records

Has been nowhere better proven than at Kenosha, Wis., where used to advantage not only in plant control but also in connection with a court case regarding the presence of copper bearing wastes in the sewage, causing cessation of proper digestion of the sludge. This case, now before the Wisconsin Supreme Court, has received nation-wide attention. The story of the case, and the part that plant records played, comes from—

H. D. RUDGAL, Sup't,
Sewage Treatment Works, Kenosha, Wis.

Forestation

Believing that water-shed forestation can not be surpassed as a post-war activity in the water supply field we are planning a series of articles dealing with this important factor in the water supply situation of America as we view it. So far two articles have been arranged for by two water works managers, of long and noteworthy experience with water-shed forestation, who will tell the important "dos and don'ts" of successful forestation. These are—

W. R. LADUE, Chief Engr. and Supt.,
Division of Water and Sewerage, Akron, Ohio.
and
DANIEL M. ROPER, Chief Engr. and Supt.,
Dept. of Water Supply, East Orange, N. J.

Metering Practices at Winnipeg

Those who have read articles by "Bill" Hurst of Winnipeg will need no further encouragement to be on the lookout for his forthcoming article describing metering practices and water maintenance procedure at Winnipeg. Formerly Water Engineer, we predicted in our June issue that Mr. Hurst would shortly be made City Engineer of Winnipeg. This elevation has now taken place, and to our detriment is the cause of a delay in the expected article which will now carry the by-line—

WM. D. HURST, City Engineer,
Winnipeg, Canada.

Why Use "Breakpoint"?

This question is answered by a young plant superintendent whose experiences with super chlorination (to the "breakpoint") of a raw water, which had proved considerable of a "problem child," seems ample proof of what true "breakpoint" chlorination can yield in the way of improved operation and economies. The experiences are those of—

E. E. CHANDLER,
Former Supt. of Filtration, Beckley, W. Va.

Solving an Oil Problem

Is the story of the effects of an oil bearing industrial waste on sewage plant operation and sludge digestion. How this waste of oil is now being reclaimed at the industrial plant and kept out of the sewer is told by—

I. O. LACY,
Supt. of Sewage Treatment, Lockport, N. Y.

With Regrets!

In this issue we had planned to run reports covering the meetings of—
The Penna. Water Works Operators Assn.
at Columbia, Pa.
and
The New Hampshire Water Works Assn.
at Nashua, N. H.

Unfortunately these meetings could not be reported in this issue because of the priority consideration of two already overly long-delayed articles which are being used in this issue.

It is our intention to print the Pennsylvania and New Hampshire meetings' reports in our next issue.

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Water Works & Sewerage is a monthly publication. Single Copies, 25 Cents; Subscription Rates U. S. and Canada, $2.00 per year; Foreign, $3.00 per year.

DO YOU LET YOUR WATER METERS *die a natural death?*

ESTIMATES indicate that a large percentage of meters in service are never removed for test and repair until they "die." Those departments which have revised their methods find that they had been losing as much as 30 to 40% in revenue that could have been collected.

An example from the experience of one such department makes this readily understandable. Out of a lot of 40 meters brought in from a typical residential street for testing and repair, 36 would not even move on ¼ gallon per minute.

Plan now on a modern meter testing program for your community. You will be surprised at how quickly you will be repaid by the results obtained. *Your Trident representative has had considerable experience along these lines and will be glad to cooperate with you.*

WATER WORKS & SEWERAGE

VOL. 91, No. 10 *A Gillette Publication* OCTOBER, 1944

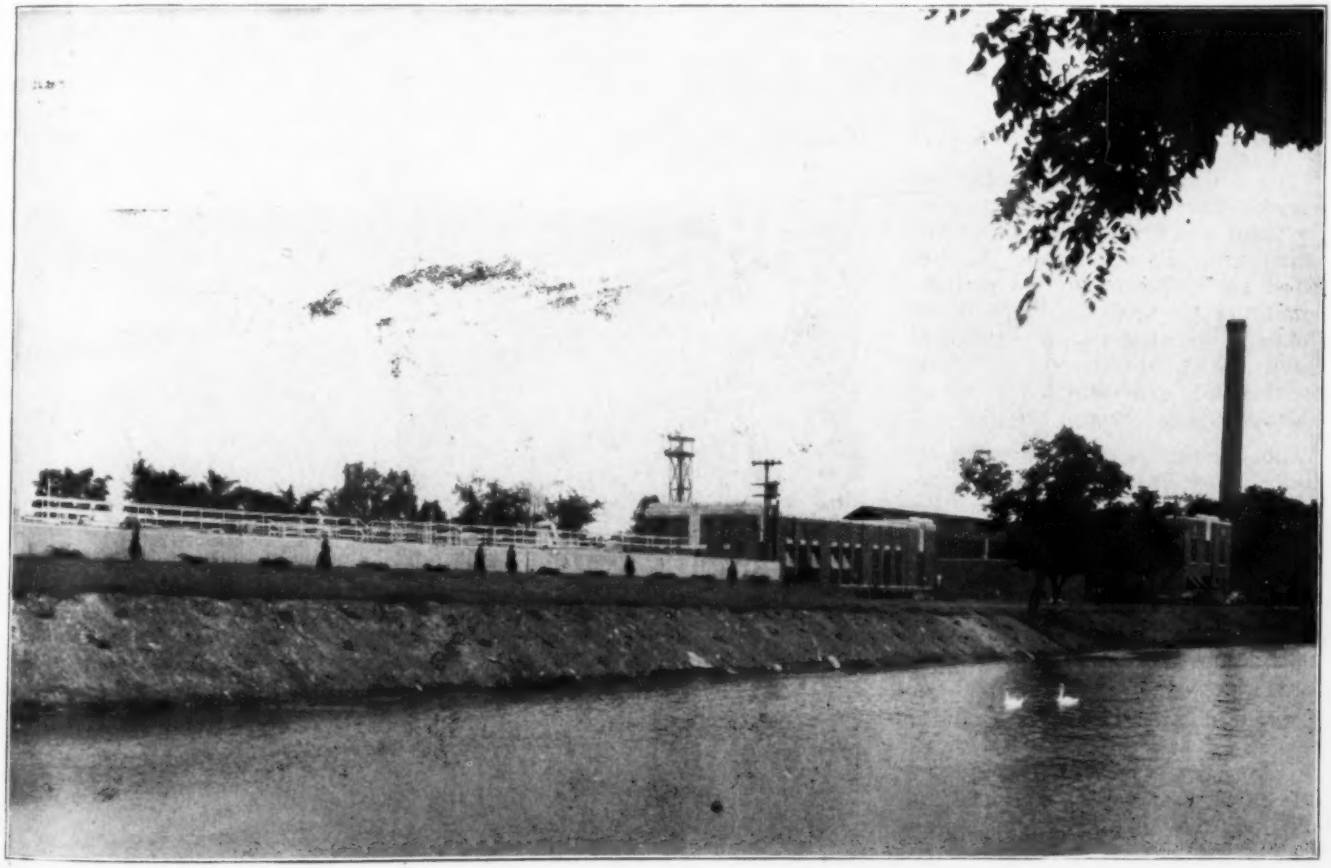
GAS ENGINE PERFORMANCE AT MARION, INDIANA

By DAVID BACKMEYER
Superintendent
SEWAGE TREATMENT WORKS
MARION, IND.

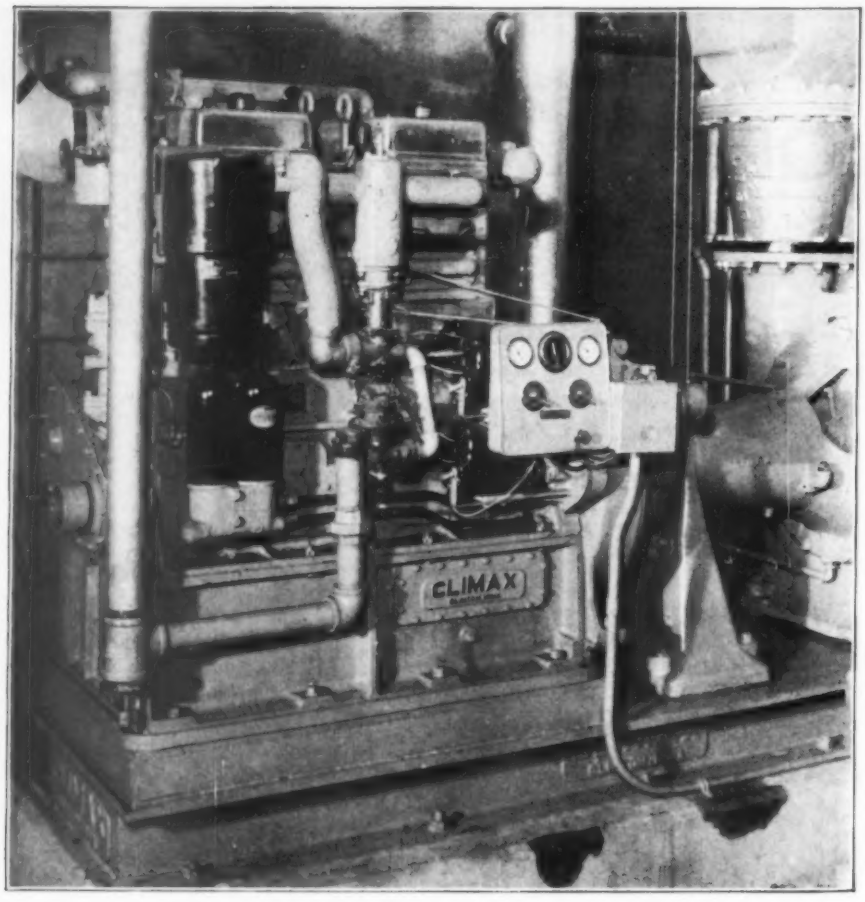
THE sewage treatment and garbage disposal plant at Marion, Ind., was put in operation in July of 1940. The plant is of the activated sludge type with separate sludge digestion. Two digestion tanks, each 65 ft. in diameter and equipped with Pacific Flush Tank Co. floating covers, provide a total digestion capacity of 167,000 cu. ft. With the exception of one district in the southern part of the city, which is served by a pumping station, all the sewage flows to the plant by gravity. The present resident population of the city is 30,000, and the average sewage volume pumped in 1943 was 3.82 M.G.D.

The Author

The power requirements of the plant fall under the following four general heads: (1) pumping of the raw sewage, a lift of 33 ft. from the wet well to the grit channel, (2) providing compressed air for the activated sludge plant, (3) operation of vacuum filter equipment for removal of digested sludge, and (4) many small motors driving sludge



Marion, Indiana, Sewage Treatment Works From the Lake



50 HP. Climax Engine Direct Connected to Chicago Sewage Pump

collectors, comminutors, water pumps, sludge pumps, water circulating pumps, etc. The average electric power consumption was 14,990 K. W. Hrs. per month in 1943.

Power Plant

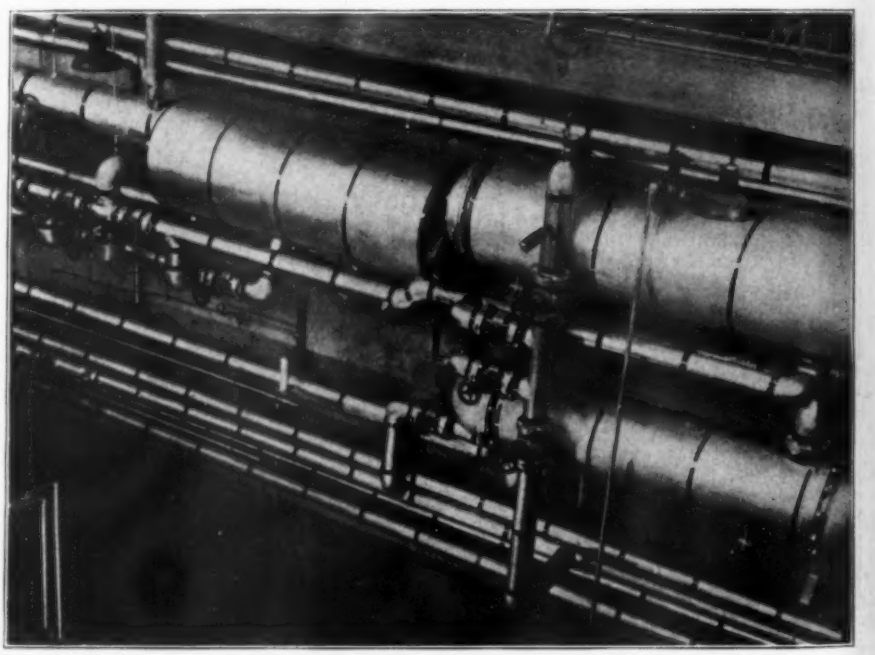
Three Climax "Blue Streak" gas engines have been in service since the plant was first started about four years ago. Two of these engines, rated at 75 horsepower, are direct connected to 1800 C. F. M. Roots Connersville blowers, and the third, rated at 50 horsepower, is direct connected to a 4000 gal. per minute Chicago sewage pump.

Gas production, augmented by the addition of ground garbage to the sewage sludge digesters, has been sufficient to furnish heat for all the buildings and digestion tanks and, at the same time, provide through the means of the gas engines 73 per cent of the total power requirement of the plant. Natural gas, purchased from the private utility company as a stand-by fuel, is piped to each of the three gas engines. By simply turning two valves and adjusting one carburetor screw, the fuel supply may be changed from sewage gas to the 1000 B.T.U. natural gas and vice versa.

Heat from the engine cooling jackets and from the exhaust gases is recovered by heat exchangers and used for heating the digesters and plant buildings. Two cooling coils submerged in the aeration tanks provide cooling water temperature control in the summer, when excess heat must be dissipated. All three of the engines are protected by automatic shut-off switches which operate on low oil pressure and/or high water temperature. Automatically controlled signal horns are located in strategic parts of the buildings to warn the plant operators when either of these conditions exist. Electrically driven stand-by pumping equipment, automatically controlled from float switches, is provided for emergency use in case the gas engine unit develops mechanical trouble.

Engine Performance

Inasmuch as the pump engine has operated a greater number of hours than either of the blower engines, its performance record will be reviewed in some detail first. This engine has pumped more than 99 per cent of the sewage treated at the plant to date. It is a four cylinder Climax engine, having a six-inch bore and seven-inch stroke with a total piston displacement of 792 cu. in. The engine has a rated horsepower of 57.6 with a maximum horsepower of 100 at top speed of 1000 R. P. M. The crankcase has a capacity of sixteen gallons. Since sewage gas is a relatively dry hydrocarbon fuel, a Marvel Mystery inverse oiler is installed to lubricate the upper end of the valve guides and the top edge of the pistons. An industrial oil of S. A. E. No. 35 has been used exclusively in the crankcase. This oil costs 51c per gallon and is purchased from the Gulf Oil



Muffler and Two Heat Exchangers for Recovery of Gas Engine Heat

Company. A Honan-Crane continuous type oil filter keeps the oil clean and clear at all times. A Gulf oil product known as Gem Oil "C" is bought at 42c per gallon and has been found to be very satisfactory for use in the inverse top oiler.

Driving the pump by direct connection, the speed of the engine is governed by a float in the raw sewage wet well. Its operation at different speeds for varying sewage flows is, therefore, practically automatic. Since the pump is most efficient at discharge rates close to 4000 gal. per minute, the engine is capable of handling peak flows at times as high as 6.0 M.G.D.

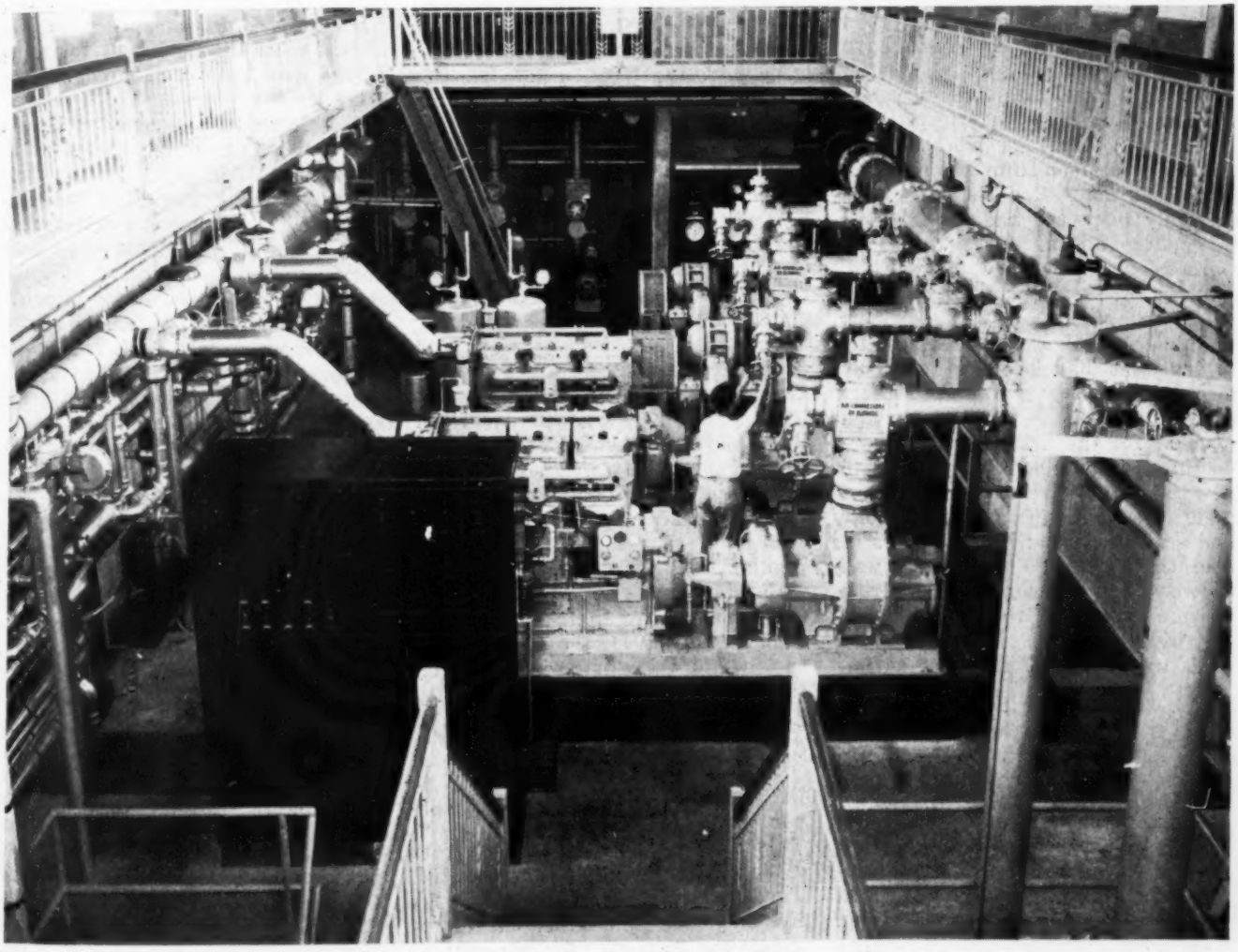
Maintenance Practice

A maintenance policy, based upon regular periodic inspections of the engines, has been followed. The length of time an engine is operated prior to dismantling and servicing depends upon the condition of the engine after a certain number of hours of continuous operation. Our pump engine was first operated for 8830 hours before it was shut down for overhauling. This period was found to be too long. The piston tops and engine heads were badly carboned; the compression rings were stuck and the oil rings were in such bad condition that they could not possibly function properly. The next inspection was, therefore, made after a continuous run of only 5130 hours. This inspection found the engine in much better condition. The rings were heavily carboned, but were still free and not frozen tight in the grooves as was the case at the time of the previous overhauling. The third overhaul was made after another run of 4310 hours, the fourth after 4720 hours, and the fifth after a run of 5530 hours. It has never been necessary to make a major repair of any kind on this engine in between our regular servicing periods.

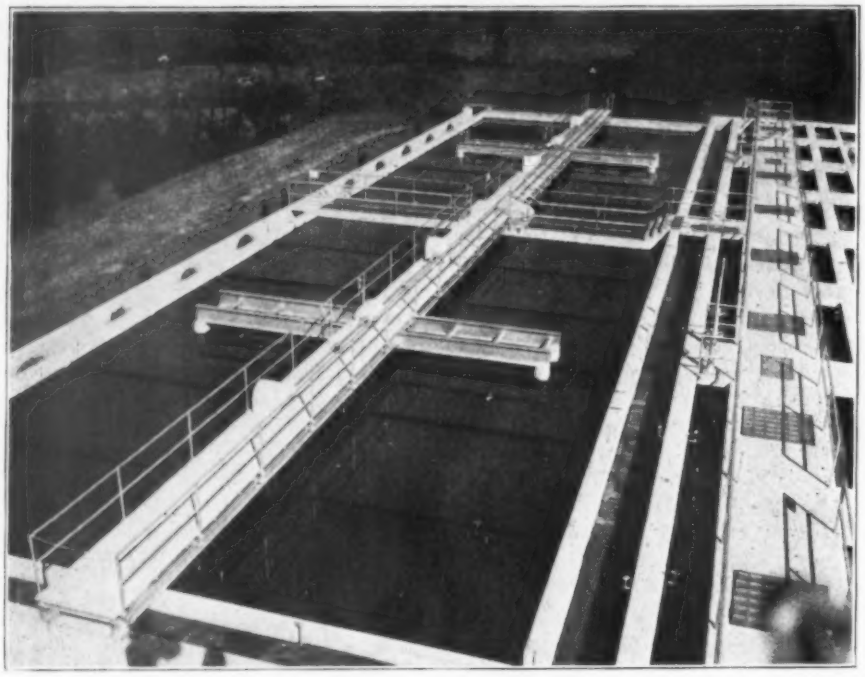
To dismantle the small 50 H.P. engine, and thoroughly overhaul and inspect it, requires about 36 man-hours labor. This work is done by our own plant operators and, in most cases, the engine is not shut down for more than 48 hours when the work is being done. The three engines are insured against mechanical failure of parts while in operation. This insurance covers labor and parts needed for replacement in case of mechanical breakdown. The insurance company sends a trained inspection engineer to the plant to look over the engine each time it is serviced. In accordance with the terms of the insurance contract, recommendations of the inspector as to maintenance policies are carried out by the insured. The insurance cost for the pump engine is $53 per year. We believe this expense is not out of line with the service and protection rendered.

Typical Inspection Report

The following inspection report, made on January 6, 1944, is typical and will give an idea as to what repairs were needed to put the engine in first-class mechanical condition after a run of 5330 hours and a total operation period of 28,544 hours:



Power House—Marion, Ind., Sewage Treatment Works
(Twin 75 H.P. Climax Gas Engines Direct Connected to 1800 cfm. Roots-Connersville Blowers)



Final Settling Tanks—Marion, Ind.
(Aeration Tanks on Right)

Engine shut down and completely dismantled for overhauling. Very little carbon found on piston tops and in heads. Engine could have run another month, as all piston rings were free, although oil rings were showing signs of sticking. All three main bearings were opened and one 0.003-inch shim was removed from each side. Rod bearings were carefully inspected and found to be in good condition. All piston rings were replaced by new rings (std. 6-in. by ¼-in. rings used) and all valve springs were replaced by new springs. All valves were replaced by valves that had been re-faced by machining. New valve-seat insert sleeves were put in both intake and exhaust for the first time. All connecting rod bolts were replaced with new bolts (per recommendation of insurance company) as the old bolts had seen more than 25,000 hours of operation. No. 1 cylinder wall showed slight "score" mark from cause unknown. Other three cylinder walls in good shape. Cylinder walls were "miked" for wear as follows:

	2-in. down	4-in. down	7-in. down	bottom
Cylinder No. 1	0.0065	0.0033	0.0020	0.000
2	0.0079	0.0060	0.0039	0.000
3	0.0070	0.0031	0.0021	0.000
4	0.0055	0.0040	0.0021	0.000

Spark plugs were cleaned and adjusted, and a complete set of new gaskets were used in assembling engine. Crankcase cleaned and flushed —very little sludge found in bottom. New earth cartridge put in Cranite filter, and crankcase filled with new oil. Oil consumption was a little less than one quart per day when engine was shut down for inspection. Oil is used as long as 6000 hours and Cranite filter is changed at 2500 hours.

All of our "Blue Streak" engines are provided with dual ignition systems. American Bosch magnetos are furnished for both the four and six cylinder engines. During the first year of operation we had considerable trouble with our magnetos. Only in a very few instances would these units stay on duty for a continuous run of 90 days. Repair costs were quite high, as gear-rotor assemblies were usually needed when an overhauling job was done. At the suggestion of the local American Bosch service headquarters, we purchased one utility magneto for the four-cylinder engine and one for the two six-cylinder engines. We were then able to remove magnetos at regular intervals of sixty days and maintain a strict servicing schedule. Our records show that, from August 1940 to May 1944, the maintenance cost of the three magnetos used on the pump engine was $207.93, fifty per cent of which was for labor. This gives an average monthly cost of $4.84 for the 43 months operated. The total maintenance cost for the five magnetos used on the larger engines was $293.97, fifty per cent of this total also being for labor. These engines have collectively operated 58 months, giving an average monthly cost of $5.05.

Dollar Savings

In preparing an estimate of the dollar savings effected by the pump engine, as compared to electrically powered equipment, an operation period of 31,238 hours ending March 31, 1944, was used. The maintenance cost for a seven-month operation period from August 1941 to March 1942 was as follows:

Crankcase oil—71 gal.	$ 30.53
Top oil for valves—90 qts.	9.00
Grease for water pump	.50
Re-facing valves	1.60
New piston rings	11.00
Magneto repairs	35.00
Cranite filter cartridges	3.00
Hose and gaskets	5.00
Two sets spark plugs	6.40
Complete set valve springs	5.20
Extra labor—garage mechanic	16.00
Insurance (pro-rated)	31.00
Total	$154.23

To completely overhaul this engine in January 1944, as previously described, cost a total of $180.15, including insurance charge. Therefore, it would be fair to assume the maintenance cost for an average year to be $286.60. (Note—No charge is made for gas purchased from the utility company since this item is more than offset by the value of the heat recovered from the engines.)

The electric utility company agreed to furnish current to the plant at the rate of 1.16c per K.W. Hr., provided the plant was made "all electric" and that no gas engines were installed. To duplicate the work done by the gas engine in pumping the raw sewage would require an estimated 191,000 K.W. Hrs. in a twelve-month year. This amount of current would cost $2215.60 at the best electric rates available. The net saving for the pump engine in one year's time is, therefore, $1929.60.

The two larger engines (rated at 75 H.P.) driving the air blowers have operated just as efficiently as has the smaller engine. The record of their maintenance cost is parallel to that of the 50 H.P. engine in all respects. Due to the variance of the B.O.D. load handled at the plant during prolonged rainy periods, two blowers are not needed throughout the entire year. Our operation record shows that the blower engines were operated singly for 77 per cent of the time, and together 23 per cent of the time during an average year. The average maintenance expense, based on a 5930-hour operation year, for the No. 3 engine, amounted to $245.76. The No. 4 engine ran a few less hours but, since it required the same number of servicings, the cost is also figured at $245.76. The

total cost for the blower engines is, therefore, $491.52.

To duplicate the work done by the blower engines in one year would have required an estimated 546,000 K.W. Hrs. of electric current. This electricity would have cost $6333.60. The actual savings accomplished by the two engines in furnishing all the air for the activated plant is, therefore, $5842.08. In one year's time, the three engines have earned a total of $7771.68. In four years' operation time they will have earned $31,086.72. It is obvious that Marion's city officials made a wise choice in choosing gas engines in preference to electric powered equipment when the plant was being designed.

Some Suggestions

Before concluding, consideration should be given to a few of the mechanical devices and design features that have helped to make our gas engine operation experience a pleasant one to date. Following are some of the more important items:

(1) Engines located in building that has *ample* ventilation.

(2) Plenty of working space around engines so that dismantling is an easy job for the operator.

(3) Provide a tool room and work shop, with cabinet space for stocking replacement parts.

(4) Provide control signals to warn operators when engines are in trouble.

(5) Have a reliable source of stand-by fuel so that engines can be kept in operation continuously.

(6) Install heat recovery facilities of sufficient size so that engine temperatures may be kept constant by automatically controlled valves.

(7) Provide oil filters to keep lubrication at highest possible efficiency.

(8) Have sufficient number of thermometers located in water circulation system so operators can easily check temperature conditions.

(9) Wherever possible, provide duplicate engine-driven equipment for emergency use.

(10) Speed of pump engine should be controlled automatically by float tube from sewage well.

Although no definite post-war plans for further gas engine facilities have been drawn up as yet, it is entirely possible that the Marion plant may be entirely free from all outside power sources at some future date. Sewage gas production approaches the 90,000 cu. ft. per day mark in the summer months, when considerable garbage is being digested. Some days as much as 25,000 cu. ft. of gas is actually wasted. This would point to engine-generator sets being installed with purchased utility gas filling in when sewage gas production does not meet the requirements of the engines. Further operation economies would undoubtedly be accomplished if such a procedure were properly worked out.

Sam Morris Made Gen'l Mgr. and Chief Engr., Dep't of Water and Power, Los Angeles

Succeeds H. A. Van Norman as Dept. Head at $25,000 Salary.

Just as we were on the press with our September issue word was received, too late for insertion, that Sam Morris has been appointed General Manager and Chief Engineer of the Los Angeles Dept. of Water and Power. He will resign as Dean of Engineering at Leland Stanford Univ. to take over his new position on October 1st, succeeding H. A. Van Norman, who retires after 37 years of service because of age and length of service limitations imposed by the Pension System of the Los Angeles Department of Water and Power—the system which he was instrumental in establishing.

Sam Morris, who in June completed a term as AWWA's president, is an alumnus of Leland Stanford (1911), and now returns to his native "City of the Angels" to accept what is believed to be the highest salaried position known in the municipally-owned water utility field.

Prior to accepting the Deanship at Stanford in 1935, Sam Morris was Chief Engineer and Manager of the Pasadena Water Dep't, a position he held for 25 years. That job he ended with a halo of fame when the massive and important Morris Dam was dedicated in the honor of its designer and builder. The complete San Gabriel Water Supply Project of Pasadena cost the tidy sum of $7,600,000. The Morris Dam was unique in several directions, including the system of cooling the curing concrete and the development of special improved cements by producers to meet setting, heating and curing specifications drawn by Chief Morris and his capable staff. He enjoyed the especial distinction of having President Herbert Hoover come to Pasadena to dedicate the dam named in his (Morris') honor. *Water Works and Sewerage* printed a picture of "Sam and Herb," together turning the hydraulic valve handle which sent San Gabriel water into the system.

Samuel B. Morris

In addition to the distinction of serving as President of AWWA, Sam Morris has many another. He has been President of both the Los Angeles and the San Francisco Sections of ASCE. In 1933 the Am. Water Works Assn. voted him its Diven Medal for having contributed outstanding services to the Association which he has served in numerous directions. During the present war he has served the United States in several directions, practically commuting for a time between Palo Alto and Washington. The nature and importance of some of his services and missions have never been revealed.

Aldrich Returns to Water Utility Operating and Engineering Field

Ellwood H. Aldrich, Consulting Engineer, New York, formerly of the partnership of Newsom & Aldrich, Engrs., has become associated as Planning Engineer with the Water Works Service Co., Inc., recently established as the operating and engineering organization for the water works properties of the American Water Works & Electric Co., Inc.

Mr. Aldrich was formerly associated with the Community Water Service Co., now managed by the American Water Works & Electric Co. For the past several years he has been actively engaged with Reeves Newsom in directing an extensive program of water works construction in the Hampton Roads area of Virginia.

WPB EASES RESTRICTIONS ON WATER UTILITIES

U-1 Orders Amended and New Standards Adopted for Processing of Applications

AS OF AUG. 31, 1944, water utilities may undertake a larger volume of work without receiving special authorization from WPB. This fact, and other changes in WPB orders applying to water utilities, are summarized in an administrative letter from Edward Falck, Dir. OWU. On the following day, Sept. 1, Mr. Falck also addressed a letter to water utilities, explaining the new standards that are to be used in processing applications for water utilities.

The principal purpose of amending the U-1 Order is to give blanket authorization to certain types of plant additions, including consumer connections. Furthermore, the requirement that certain purchases must be cleared through the Regional Utility Engineers has been revoked, and certain restrictions regarding scheduled deliveries on a calendar quarterly basis have likewise been revoked (Par. e-1 and Schedule B).

Change in Minor Plant Addition

The net dollar value included in a "minor plant addition" has been increased from $1500 to $10,000, and applications are not required for plant additions below $10,000 except for extensions of lines to serve new customers not authorized by supplementary order.

Hereafter, preference rating AA-1 may be used to purchase meters where they are needed to replace defective meters in service, or to replenish the minimum inventory required to be held for replacements. Preference rating AA-3 must be used when the meters are required for other purposes.

Inventory

A new restriction is that which prohibits the purchase of any item of material if the item, or a practical substitute therefor, is available in the utility's inventory in excess of minimum requirements.

Under the new provisions, utilities whose inventory is $25,000 a year or less need not maintain their inventory accounts by materials "classes"; *but* such inventories are subject to the restriction that items of material must not be ordered in excess of a ninety days' supply.

Regarding Construction

A change has been made concerning alterations or construction of buildings ,in anticipation of a forthcoming amendment of Limitation Order L-41, which will exempt the construction and alteration of buildings by producers, as defined in U-1, from the controls of L-41.

Where utilities constructing buildings formerly had to conform to restrictions not only of U-1 but also of Schedule A to CMP Reg. 6, when the cost was over $800 (structural or reinforcing steel or stress grade lumber), now utilities will apply on WPB-2774 whenever the cost of the materials exceeds $10,000, or if the utility wishes to use a structural design or a material prohibited by Sched. A to CMP Reg. 6.

Pipe, except copper and brass, may now be ordered in minimum carload quantities; and any material may be ordered in a minimum procurable quantity. For example, if a utility requires a small amount of a special type of material not obtainable in a manufacturer's or dealer's stock, a minimum mill run may be ordered even though such a quantity would exceed 90 days' requirements.

Sales of Material

Utilities are now relieved by this revised U-1 Order of the necessity for keeping continuous records of excess inventories and of reporting them. This change, together with another deletion from the order, also removes the provision that a utility must offer for sale or sell any material in excess inventory. It should be noted, however, that the order continues to require the sale of material to another utility for the repair of an actual breakdown.

The rules applicable to sales of material have been simplified, and such sales are entirely independent of Pri. Reg. 13. Sales between utilities of any material may be made without a preference rating, or an allotment number, as may sales of used equipment to non-utility purchasers, the latter subject, however, to the provision of WPB applicable orders and regulations for certain items.

Other Changes

In conformance with the general change regarding the increase from $1,500 to $10,000 allowable for "minor plant additions," other changes were made in several paragraphs of the order and have been reflected in supplementary orders U-1-a, U-1-d and U-1-f, while the $1,500 limitation has been retained in U-1-g. Certain other changes have been made in the supplementary orders restricting extensions to 1,000 feet in length of service to commercial consumers; in defining "domestic, industrial, and commercial" consumers.

Housing Utilities Standards

The Housing Utilities Standards have been revised by extending to 250 feet, the length of pipe per dwelling unit permitted for extensions; allowing an extension up to 1,000 feet where remodeling or construction of one to three structures is considered; increasing the permissible length of service to 1,000 feet to domestic and commercial consumers; relaxing restrictions on the installation of copper and copper base alloy pipe (this does not imply that copper tubing will soon become available for purchases).

New Standards in Processing Applications

New standards for screening applications from water utilities have been effected, to improve reliability and quality of water service which may have been impaired during the war period. Water utilities which have need for new facilities along the *following lines* are requested to submit applications promptly, because this moderate expansion program is strictly limited by available quantities of material and manpower:

1. A new or additional supply.
2. New or additional treatment facilities.
3. Pumping equipment.
4. Transmission facilities.
5. Elevated storage tanks.

Mr. Falck's letter requests that although favorable consideration will be given to applications for construction under these five categories, each utility should select only the more urgent projects out of its backlog of deferred construction.

SIXTY-THIRD ANNUAL MEETING OF NEWWA

Part I—Symposium and Entertainment Feature First Half of Meeting

THERE was probably no more appropriate, certainly no more pleasant place to hold the 63rd meeting of the NEWWA than at the home of the famous and even older Poland Water at Poland Spring, Me.

Presidents

Outgoing
Horace L. Clark
Supt. & Gen. Mgr.
Water Dept.
Sanford, Me.

Incoming
Karl R. Kennison
Chief Engr.
Met. Water Dist.
Boston, Mass.

Something for everyone must have been the desire of the officers and arrangements committee for this meeting attended by 476 registrants, including many wives. Whether or not it was golf, tennis, horseshoe pitching, putting, bridge, strolling the beautiful grounds, playing the organ in All Souls Chapel, visiting the 36 exhibits of the manufacturers' association, dancing at the costume ball, watching Lloyd Nelson make milk disappear from a pitcher at the annual dinner, eating far too much of an unending variety and quantity of food each meal, drinking the famous Poland Water from the equally famous green bottle, or attending the technical sessions, certainly all present were pleased with their stay at Poland Spring.

Business Meeting

Not all of the interest was in the pursuit of pleasure, for even the business of the Association received its due attention. Officers elected for the ensuing year were:

Pres.—Karl R. Kennison, Ch. Engr., Met. Dist. Water Supply Comm., Boston, Mass.

Vice Pres.—Harold Griswold, Deputy Mgr. & Ch. Engr., Met. Dist., Hartford County, Hartford, Conn.

Vice Pres.—Arthur L. Shaw, Metcalf and Eddy, Engrs., Boston, Mass.

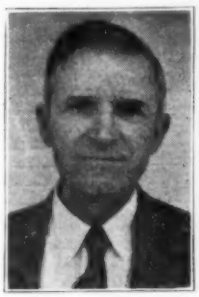
Directors—Donald C. Calderwood, Nashua, N. H.; Arthur C. King, Taunton, Mass.; Sidney S. Anthony, Augusta, Me.*

Secy.-Treas.—Frank J. Gifford, Cambridge, Mass.

Other business included the awarding of an Honorary Membership to Arthur D. Weston, Ch. Engr., Mass. Dept. of Pub. Health. Roger Esty, Supt. of Water and Sewers in Danvers, Mass., was continued in the chairmanship of the Hydrant Specification Committee. (Mr. Esty holds the same chairmanship in the AWWA.)

Secy.-Treas. Frank J. Gifford reported an even 800 members and assets of over $24,000. Prof. Gordon Fair of Harvard reported, as editor of the Journal, that 442 pages of text plus advertising had been published at a cost lower than the several years previous. Curtailment of general committee activity, because of the war, was reported by the Committee on Committees, which also reported that several committees born out of the war had found less to do because of the improvement in the general war situation, particularly as regards civilian defense.

This committee has again recommended the creation of a public relations or publicity committee, or the hiring of a paid publicity agent to enlighten the general public not



Honored

Dexter Bracket Medal
Thos. R. Camp
Cons. Engr.
Boston, Mass.

Honorary Membership
Arthur D. Weston
Chief Engr.
Mass. Dept. of Health

Vice Presidents

H. W. Griswold
Dep.Mgr.&Ch.Engr.
Water Bureau
Hartford, Conn.

Arthur L. Shaw
Metcalf & Eddy
Engineers
Boston, Mass.

*Elected to fill the term of the late Sam Ellsworth who died before taking office.

Here and There

(1) *B. E. Frisbee, Trustee and Judge Boulter, Bd. Chair. of Kittery Water District, talk with Bob Ferguson of Hersey Meter.*

(2) *Cameraman Esty and actors (Scotty Marshall, Ted Cate, Mrs. Melley, Mrs. Esty, and Mrs. Cate)*

(3) *Mrs. Ted Cate, Laconia, N. H.; Mrs. Roger Esty, Danvers, Mass.; Miss Beatrice Clark, Sanborne, Me.*

(4) *John Stenner, Mueller Co., and Harold Griswold, Hartford, Conn.*

(5) *Bill Wickwire of Edson Corp., and H. H. Draper of H. H. King Co.*

Costume Ball

(1) *Mr. and Mrs. L. G. Carlton, Springfield, Mass.*

(2) *Mr. and Mrs. S. S. Anthony Augusta, Me.*

(3) *Mr. and Mrs. Clinton Inglee New York, N. Y.*

(4) *Mr. and Mrs. Joe C. Knox Boston, Mass.*

(5) *Mr. and Mrs. Don Calderwood Nashua, N. H.*

(6) *Mr. and Mrs. Earl Tarr Winthrop, Me.*

only on the heroic service of the water works man in this war but also his faithful service to his community in times of peace as well.

The Legislative Committee reported a Massachusetts law which requires that sub-contractors submit bids to the community, as well as to the general contractor, two days before the bid letting. The municipality may request subcontractors to bid even though the general contractor has not. On the basis of the bids submitted, the municipality may dictate the choice of subcontractor to the general contractor. In general discussion it was agreed that the utility should require a surety bid bond from the subcontractors as well as the general contractor.

Twenty-five-year certificates signifying service of twenty-five years or more to a single community by members who have belonged to NEWWA for twenty-five years or more were awarded to the following:

Henry F. Beal, Waltham, Mass.; Gustavus H. Bean, Derry, N. H.; M. W. Carroll, Millers Falls, Mass.; Benjamin E. Fox, W. Springfield, Mass.; Timothy M. Good, Cambridge, Mass.; Scotland Highland, Clarksburg, W. Va.; Joseph Hoy, Worcester, Mass.; Walter McMahon, Chelmsford, Mass.; Morrison Merrill, Wakefield, Mass.; LeRoy Peterson, Duxbury, Mass.; A. B. Thompson, Kennebec Dist., Waterville, Me.; Milton Thorne, Portland, Me.; Roswell M. Roper, E. Orange, N. J.

Other committees likewise reported, among them the Committee on Cast Iron Pipe, which asked for a specification on tar coatings for pipes.

Dexter Bracket Medal

At the first general luncheon for members and guests an address of welcome was given by Frank E. Southard, Chairman, Public Utilities Commission of Maine. Mr. Southard took the opportunity not only to welcome those in attendance, but also to emphasize the fact that the warlike and aggressive characteristics of the Nazified Germans are not a development of the past decade under Hitler but are inborn characteristics that have existed for centuries in the German people.

The Winners

Roger Esty, Danvers, Mass., and Mrs. W. W. Brush, New York City (Won the Costume Ball Prizes as "Si, the Farmer" and Martha Washington)

Presentation of the Dexter Brackett Memorial Medal was made by James A. Newlands, Chairman of the Committee, to Thomas R. Camp, Consulting Sanitary Engineer of Boston, for his paper before the 62nd Annual Meeting of the Association last year, on "Hydraulics of Distribution Systems—Some Recent Developments in Methods of Analysis." The paper was published in the Journal of the NEWWA.

Water Supply in the North African Campaign

William E. Stanley, Prof. of Sanitary Engineering at M. I. T., was a Major in the Engr. Corps this time last year and was winding up his duties as Water Supply Officer for the North African campaign. Leaving out the censorable information, "Bill" still was able to take his listeners almost to the front lines in those now historic battles around Oran and Tunisia.

Waters in this semi-arid area were often too salty for our men to drink. Even the "sweet" water had as much

Golf for Everyone

(1) *On the Green Sigworth, Joe Wafer and Prof. Lendall.*

(2) *Mr. and Mrs. Don Calderwood, and Mrs. Casey Jones finish a round.*

(3) *Symonds, Millbury, Mass.; Evans, Mueller Co.; Klein, Mueller Co.; Jette, Mystic Valley, N. H.*

(4) *Mr. What's His Name holes out while Sid Anthony and Harold Hanna watch.*

(5) *Mrs. Esty sinks a long one. Intent spectators are Mr. and Mrs. Ted Cate and Mr. and Mrs. Scotty Marshall.*

And More Costumes!

(1) *Herb. Crowell, Haverhill, Mass. and Mrs. James Guillemette, Pawtucket, R. I.*

(2) *"Reggie" Hayes, Boston, Mass., and Mrs. Richard Smith, Hamilton, Mass.*

(3) *Mr. and Mrs. Charles Eastwood, Newark, N. J.*

(4) *Mr. and Mrs. Al Lash, Quincy, Mass.*

(5) *Mr. and Mrs. F. F. Longley, Ampere, N. J.*

(6) *Mr. and Mrs. A. F. Burke, Augusta, Me.*

as 750 ppm. of NaCl present, and these sweet water springs were generally too far from a city and of too small capacity to be of great help. The quantity of water used by civilians in the area was approximately 10 gpcd. and was kept at this low figure by rationing, which consists of shutting off the water supply on opposite sides of the street every other day.

Prof. Stanley described how he was given but six days to implement a water company, both men and equipment, in order that there would be two companies for the campaign. Fresh water had to be shipped with the troops and it was necessary to clean 5500 steel drums (55 gal. cap.) that had contained gasoline, solvents and the like, and to have them ready for shipment in a week.

That the American Army can do the impossible is evident from Prof. Stanley's report on how this task was accomplished in the short time available.

In the field, each water company handled 14 water points and in many cases delivered water in wine trucks. The combination of salty water flavored with wine was hardly one to be relished, but it had to serve. In some cases salt water of 3000 ppm. NaCl was diluted with fresh water shipped from England to produce a water of 1500 ppm. NaCl. This was barely palatable.

Prof. Stanley also told of the allotment of water to hospitals, service units, and to the soldiers, the latter receiving only one gal. per day much of the time. Of nine railroad supplies, four were softened and the others should have been with a typical analysis of 380 ppm. of hardness and 1640 ppm. of salt. Shortage of water was a harassing problem inasmuch as, during the summer, 380,000 gal. were required and only 233,000 gal. were available. The effect of this hard water on engines was obvious, but the French had been unable to find good and sufficient water in a hundred years of searching.

Director
S. S. Anthony
Supt. & Engr.
Augusta, Me.

Prog. Chairman
Joe C. Knox
Asst. Engr.
Mass. Dept. of Health

Laws Governing Water Utilities

"Public utilities are governed more than any other organization in an over-governed society," according to David E. Moulton, Attorney for the Portland, Me., Water Dist. The Common Law is still recognized, to the effect that public utilities should be a regulated market and must serve all persons, and like all other industries, the public utility, according to the supreme court, is subject to control under the police powers. If there is no commission authority to govern, then the common law holds and a water works is subject to court regulation.

As to the extent of the regulations under which a utility operates, Mr. Moulton cited the following laws or regulations: common law, state statutes, commission regulations, governmental bureau orders, terms of the franchise, as well as its own acts, rules and regulations.

Other statements made by Mr. Moulton included: Water utilities do not sell water, they sell service—Structures not persons are the recipients of such service—Water utilities have no right to construct on private property—Common law has some wonderful loopholes, it may be set aside by legislation or adopted by the courts.—Commissions

And More Golf!

(1) *Al Lash and "Smoke" Clement on the green.*

(2) *Jerry Manahan, A. P. Smith Co.; Roy Marquardt, Jamaica Water Co.; Tom Halpin, A. P. Smith Co.*

(3) *Frank Bachman, The Dorr Co., New York, N. Y.*

(4) *Fitzsimmons, Kennedy Valves; Lewis, Tate Pipe Linings; Flanders, Worthing-Gamon Meters.*

(5) *"Biff" McGarry and J. D. Thompson of Neptune Meter.*

Program Participants

Roger Esty
Superintendent
Water & Sewers
Danvers, Mass.

E. Sherman Chase
Metcalf & Eddy
Engineers
Boston, Mass.

David E. Moulton
Attorney
Water District
Portland, Me.

H. G. Dresser
Thos. R. Camp
Engineers
Boston, Mass.

A. E. Griffin
Tech. Serv. Div.
Wallace & Tiernan
Newark, N. J.

Paul Howard
Whitman & Howard
Engineers
Boston, Mass.

have extensive but not absolute authority over utilities.

M. L. Brashears, Jr., and C. M. Roberts of the USGS reported on studies on ground water supplies, particularly in N. E. Massachusetts, and gave a summary of the amounts and sources of ground water used by both municipalities and industry.

Practices and Trends

At a symposium on *Present Practice and Trends in the Water Works Field*, Ralph W. Horne, of Fay, Spofford, and Thorndike, Boston, spoke on the subject of "Ground Water Supplies." According to Mr. Horne, 65 per cent of the U. S. supplies are from ground water sources. In cities of 25,000 and less the ratio of ground to surface water supplies is about 50-50. In municipalities of 5,000 population and less ground water supplies make up 75 per cent of the total. Ground water is generally hard, but free from bacteria. Any treatment it needs usually is for the purpose of removing scale forming minerals.

Mr. Horne also discussed types of ground water, (particularly as to source or method of obtaining) mentioning infiltration galleries, dug wells, driven wells, artesian wells, tubular driven wells, gravel packed wells, and radial process wells.

In New England most of the ground water supplies are either tubular or gravel packed wells. The cost of a gravel packed well is from $10-$15,000 per mgd capacity. Radial process wells are from $10-20,000 per mgd. cap. up to 25 mgd. Infiltration galleries are much cheaper.

There are advantages and disadvantages for each kind or type of well, but the trend seems definitely to be toward the gravel packed well, for the ratio of gravel packed to tubular in the 1930-40 decade was 5 to 4 but since that time has been 2 to 1.

Other general trends in ground water supplies have been to prove the supply by exploration; to limit the velocity of flow; to stabilize the developing operations; to procure the maximum safe usage but not exceed it; and to conserve funds by developing the best possible application for each individual location.

Directors

Don C. Calderwood
Engineer
Pennichuck Water
Nashua, N. H.

Arthur C. King
Supt. & Clerk
Water Works
Taunton, Mass.

Filtration Trends

According to E. Sherman Chase, of Metcalf and Eddy, Engrs., Boston, there has been little change in the fundamentals of filtration in the last thirteen years. Such developments as have been made are in the rapid sand filter, and the most important trend has been the increasing stress laid on the pretreatment of the water before it is applied to the filter.

As to the pretreatment Mr. Chase said that the use of activated carbon for the removal of tastes and odors had generally caused aeration as a treatment to disappear. Alum continues to be the standard coagulant and softening continues much as before, with the exception of the introduction of new types of upflow coagulating and settling basins where the precipitated sludge is utilized to help form and remove the floc.

Two-story settling tanks have been used at Milwaukee, but this design is primarily to save space and

After the Ball Was Over

(1) *Mr. and Mrs. Eben Lufkin, Boston, Mass.*

(2) *Horace Clark and daughters, Joan (left) and Beatrice (right), Sanford, Me.*

(3) *Mr. and Mrs. "Casey" Jones, Philadelphia, Pa.*

(4) *Mr. and Mrs. Robt. Mannheim, Providence, R. I., and Mrs. Don Calderwood, Nashua, N. H.*

(5) *Mr. and Mrs. Arthur C. King, Taunton, Mass.*

(6) *Mrs. H. Siever Jones, New York; Charlie Becker, Philadelphia, Pa.; Mrs. E. D. Case, New York*

Hold It!

(1) *Mrs. Madison Goff, Milford, Mass.*
(2) *Mr. and Mrs. Maurice Libby, Bath, Me.*
(3) *Fran Burr, Boston, and Mrs. J. M. Angell, New York*
(4) *Mr. and Mrs. L. H. Enslow, New York, N. Y.*
(5) *Mr. and Mrs. Sidney Bean, Wehmouth, Mass.*
(6) *A. E. Griffin and Chas. Eastwood, of W&T*
(7) *H. Siever Jones, New York, N. Y.*

has not been adopted elsewhere. Control of pH by lime and soda ash, and of disinfection by chlorine, continues to be standard while chlorine dioxide has been introduced for taste and odor control.

Except in industrial plants and zeolite softening, the pressure filter has not been widely used. Open rapid gravity type filters have shown little change; underdrain systems are varied, with the perforated grid pipe still the most common. Anthrafilt as a filtering medium is increasing in use. Sand particle sizes have been increased, in view of the dependence on pretreatment and chlorination for final disinfection. High rate wash, with supplemental surface wash, is becoming more general and air wash is disappearing from modern plants. The tendency seems to be toward the use of wash water pumps, drawing directly from the clear well rather than separate standpipes. No radical design changes have been made in filter plant accessories such as rate controllers, but filter rates have generally been stepped up because of the exigencies of the war.

New England depends to a limited extent on badly polluted waters and, consequently, filtration practice is largely for the purpose of reducing colors and for removing taste and odors.

Trends in Chlorination

Mr. A. E. Griffin, Asst. Dir., Tech. Service Div. of Wallace and Tiernan Co., gave a review of the past five years in water chlorination.

Beginning with break-point chlorination as it was introduced in 1939 and so dramatically used by Brown in Ottumwa, Iowa, (with a 110 ppm. dose), Mr. Griffin traced the trends in this particular phase of water treatment.

Significant has been the development of tests to differentiate between active "free" chlorine and chloramine residual, and these have included the Laux test, the Laux-Nickel Test, Kernath's methyl orange test, the amperometric titration, Moore's para-aminodimethyl aniline test, the Hallinan test using arsenite, and last, the two reading ortho-tolidine test wherein a flash reading in ten seconds gives the free chlorine while the reading at five minutes gives both free and chloramine residual.

The quicker effectiveness of the "free" chlorine on bacteria has been demonstrated as a means of improving the applied water before filtration, and for the prevention of aftergrowths of all kinds in the distribution system.

Mr. Griffin spoke of the relation of chlorine to ammonia at the break-point, of the necessity of maintaining a ratio of three parts of O-T to one part of chlorine in the test, and of the work of Chamberlain and Glass on the spectrophotometric determination of residual chlorine in which they showed that, while the permanent standards were not an exact match of the color, the difference could not be detected by the eye.

Mr. Griffin also gave his audience the latest definition of chlorine demand, that of the AWWA Committee on Chlorination Control, and discussed the introduction of several new terms to the field in the last five years. These include break-point, marginal, and secondary (meaning chlorination in the mains) in addition to the older terms of chloramination, superchlorination and pre- and post-chlorination which depend on the mechanical set-up to determine when pre-chlorination may be post-chlorination.

In plant practice there is a tendency to carry a free chlorine

Look Pretty Please!

(1) *Mr. and Mrs. Wm. B. Duffy, N. Andover, Mass.*
(2) *Mrs. L. B. Smith, Rochester, N. Y. and Mrs. A. R. Whittaker, New York, N. Y.*
(3) *Dr. and Mrs. Geo. E. Symons, New York, N. Y.*
(4) *Mrs. Lee Chamberlain, New York, N. Y.*
(5) *Mr. and Mrs. C. W. Baldwin, Boston, Mass.*
(6) *Mr. and Mrs. V. N. Bengle, Indian Orchard, Mass.*

Mr. and Mrs. Is the Name

(1) *The Lewis Smiths, Rochester, N. Y.*
(2) *The Sid Anthonys, Augusta, Me.*
(3) *The Horace Clarks and daughters Beatrice and Joan, Sanford, Me.*
(4) *The Don Calderwoods Nashua, N. H.*
(5) *The Arthur Gormans Washington, D. C.*

residual in the distribution system, to chlorinate reservoirs, to clean filters with chlorine, and to remove color with chlorine.

In closing Mr. Griffin gave a summary of 12 points regarding the history of chlorine application to water supplies in the past five years.

Distribution Piping

"Piping for Distribution Systems" has not changed greatly in the last several years, according to Herman G. Dresser, Boston; asbestos cement pipe being the latest addition to cast iron, cement lined and steel pipe. Centrifugal casting of cast iron has produced a denser pipe which has many other advantages. Steel must of necessity be lined to prevent corrosion. Lead caulking was in vogue until 1920 but since that time has waned in favor of sulfur compounds.

Cement lining covered with bitumen and spun bituminous lining are more recent developments, as in lining pipe in place with cement. Dresser couplings and other mechanical joints have found favor since 1932. The bell joint clamp and the recent bell-master joint may be expected to replace the bell and spigot joint which was first introduced in 1785.

Mr. Dresser expects future developments to be corrosion-proof outsides and possibly plastic linings.

Pumping Stations

Trends in pumping stations have been bound to changes in pumping equipment, according to Ralph P. Hall of Boston. Reciprocating pumps have given way to electrically driven centrifugals with standby equipment. Pumping stations are usually nearer the source of supply than formerly, except for booster stations. Stations are generally of more pleasing architectural design and larger. Gravel packed wells with only the motors above ground, and plants with complete dual equipment, are definite trends as is the conversion of steam to electricity. Diesel engines are not always the proper installation, according to Mr. Hall, but each should be studied on the merits of the situation. Priming systems and the regulation of surge

Secretaries

NEWWA	WSWMA
Frank Gifford	*Arthur Clark*
Cambridge, Mass.	*New York, N. Y.*

are important, but self-priming pumps have not been popular because they are inefficient.

Standpipes

Howard E. Bailey, of Boston, said that there has been little change in the foundations of elevated standpipes and tanks. Old wrought iron tanks are now being replaced, prestressed concrete tanks are now competing with steel tanks, and welded tanks may be expected to supplant riveted tanks, after the war.

Mr. Bailey also spoke in some detail on wire wrapping to prestress concrete tanks with the oval dome, as well as on the method of sandblasting for painting and the use of flame cleaning before painting. Colors have gone from black through dark green and leaf green, to aluminum paint.

Cathodic protection has proved to be a real boon, and it has been found unnecessary to remove the electrode in the winter. Trends in shape have been toward the ellipsoidal, and the radial cone, which give a mushroom type appearance. Future trends, Mr. Bailey believes, will be toward more prestressed concrete tanks, improved welding and changes in shape of the tanks.

Financing Water Systems

Speaking on the subject of "Financing Water Systems in Massachusetts," Paul F. Howard, of Whitman and Howard, Boston, told how it was possible to use bonds which do not require the start of repayment until three years after the completion of the project. The limit of the borrowing power depends on the taxes and must be determined from the number of possible takers of water.

It has generally been found that water takers increase about 8 per cent a year after the water works is established. Tax rates vary from one to nine dollars, but average about $4 per thousand. The cost of mains is about $18-20,000 per mile, including pumping and storage equipment.

The cost per possible taker is important. In Massachusetts it varied in the last decade from $180 to $550 with the lower values obtaining where PWA funds were used. Without PWA the average cost per possible water taker was $350-550.

Mr. Howard closed with the warning, "Care should be exercised to insure that the construction of the system is justified," and suggested that, although the tax rate may be increased, the reduction in fire insurance rate will often offset that increase.

Office Practice, Billing and Collection

Roger Esty, Supt. of Water and Sewers in Danvers, gave his usual performance, telling an interesting story, interspersed with philosophy, humor, and some very sound advice and suggestions.

Not being able to divorce himself completely from his work as Supt. of Sewers as well as water, Mr. Esty told how, in Danvers, it had been decided that the municipality would make the house connections and charge the householder on a time payment basis.

Legal difficulties seemed to hamper this plan, and it appeared that sewering of the houses in Danvers was doomed to failure. Such a fate reckoned without the persistence of

one Roger Esty, who took copies of every water and sewer bill in the state and carefully read all of the fine print on each. One gave him the answer. If the consumer will write a request to the municipality, asking that the sewer connection be made and that he be allowed to pay for the work in installments added to his water and sewer bill, then the construction can be so made and so paid for. The moral of this little story is, "Always read the fine print!"

In regard to customer relations, according to Mr. Esty, one of the best things a municipality or water utility can do is to "have a good man behind the counter," for he often *is* the water company to the consumer and his personality may do much to improve or worsen the attitude of the consumer toward the utility.

Danvers once had a large bill delivered by hand, but has found the small bill delivered by mail to be much more advantageous for many reasons. Bills made out on machines likewise are preferable. "How many customers make a billing machine worth it?" is not necessarily the proper question when one is considering the purchase of such a machine. Billing machines cut the amount of office work and, while they may not eliminate any actual help, they may and do often eliminate the need for hiring extra help, particularly at the end of the year. Billing machines eliminate many costly mistakes in making out bills, eliminating particularly the errors of transposition so common in hand work.

Custard pies were once a popular form of weapon in the old slapstick comedy movies, and Roger Esty has had his share, but not in the same manner. Mr. Esty's experience on the receiving end of the custard pie has usually been as a reward from an irate consumer whose ire has been cooled by the quick, courteous, and pleasant way in which Mr. Esty has answered the complaint. Visits to the home, and a chat with the complainer, usually are sufficient to find the cause of the complaint and recreate pleasant relations. For a quick estimate of the amount of water a service should consume, Mr. Esty uses five cu. ft. per person per day. For more definite proof of excess consumption of water, Mr. Esty says there is nothing like the Meter Master, which by its squiggles shows, not only when each member of the family attended to his daily personal functions but also when junior took his shower, when father shaved, mother washed the dishes, and when baby had a drink in the middle of the night. Customer complaints thereafter generally give way to custard pies, with fork and napkin, and a happy consumer is assured. (Ed. Note: The pies must be good, for Roger Esty looks very well indeed.)

Mr. Esty believes that, after the war, many utilities will find it advantageous to modernize office equipment. (Anyone interested may obtain copies of Mr. Esty's billing methods by writing him.)

There is one other important consideration that needs attention in the matter of the psychology of office management and customer relations, according to Mr. Esty. That is the matter of the title of the man in charge of the utility. Many utilities use the title of Superintendent, some even use Foreman, some Clerk, and others Ch. Engineer, for the man who actually is charged with the responsibility for the over-all management and supervision of the operation of the utility. To the lay public, a clerk keeps the records, a foreman bosses a gang of workmen, a chief engineer supervises the operation of the mechanical equipment, and a superintendent supervises the production of the whole operations. (And, according to the dictionary, the lay public is not far from right.) When the average person comes into the utility, wanting to see the top man, he has these definitions in mind and he doesn't want to see any of those fellows. He wants to see the Manager or General Manager.

Mr. Esty is convinced that the use of the title General Manager or Manager, for the man in charge of the utility, would be a step in the right direction in the matter of customer relations.

Also scheduled on the program, but not present to read their papers, were George A. Sampson, of Weston and Sampson, Boston ("Surface Water Supplies"), and George S. Ryan, Dept. of Pub. Works, Water Div., Boston ("Organization of Emergency Repair Work").

Entertainment and Exhibits

Wednesday afternoon was given over entirely to the entertainment of the guests, with a golf tournament for the men and a bridge party for the ladies. The evening, likewise, was a special event with a costume ball attended by over a hundred persons in costume. A putting contest was held for the ladies on Thursday afternoon, and the Manufacturers' dinner on Thursday night completed the entertainment, when Clint Inglee sang and Lloyd Nelson mystified his audience by tearing paper napkins, making tassles move up and down and pouring milk into a paper funnel that ran nowhere and never got wet.

Golf prizes were distributed at the Thursday evening banquet to the winners as follows:

For low gross—Active Members:
1. Don Calderwood, Nashua, N. H.
2. Roger Esty, Danvers, Mass.

Assoc. Members and Guests:
1. R. E. Murphy, Augusta, Me.
2. Ray Marquardt, Jamaica, L. I.

Kicker's Handicap—Active Members:
1. Tom Hagarty, Somerville, Mass.
2. Stanley Dove, Boston.
3. A. M. Symonds, Millbury, Mass.

Assoc. Members:
1. E. A. Sigworth, Ind. Chem. Sales.
2. J. J. Butler, W & T.
3. H. S. Hutton, W & T.

Tennis doubles were won by Palmer Peterson of Portland and Edgar Buttenheim of New York, with Jim Cook of Proportioneers and Jim Jones of Portland second. In the ladies' putting contest, Mrs. Robert Mannheim of Providence, R. I., won first with a one over score of 37. Mrs. Sidney S. Anthony, of Augusta, was awarded a putting contest prize for not only the highest but also the most unusual score, having had every number of strokes to match the number of the holes on the first nine except a six.

Prizes were also awarded at the costume ball for the most original costuming; the awards going to Mrs. W. W. Brush of New York City for her characterization as Martha Washington, and to Roger Esty for his excellent portrayal of "Si, the Farmer."

Exhibitors at the meeting totaled thirty-six and the exhibit hall was one of the most attractive ever set up at Poland Spring House, according to the manager. Manufacturers who had exhibit space included:

American City Magazine
Builders-Providence Co.
Chapman Valve Mfg. Co.
Chicago Bridge and Iron Co.
The Dorr Co., Inc.
Dresser Mfg. Co.
Edson Corporation.
Electro Rust-Proofing Corp.
Engineering News Record.
Flexible Underground Pipe Cleaning Co.
The Foxboro Co.
Hersey Mfg. Co.
Homelite Corporation.
Hydraulic Development Corp.
Industrial Chem. Sales Div. W. Va. Pulp and Paper Co.
Johns-Manville.
Layne & Bowler, Inc.
The Leadite Co.
Lock Joint Pipe Co.
Mueller Co.
Neptune Meter Co.
National Water Main Cleaning Co.
Pittsburgh Equitable Meter Co.
% Proportioneers, Inc. %
Public Works Magazine.
Red Hed Mfg. Co.
Royer Foundry & Machine Co.
A. P. Smith Mfg. Co.
Thomson Meter Corp.
United States Pipe and Foundry Co.
Wailes Dove-Hermiston Corp.
Wallace and Tiernan Co., Inc.
Warren Foundry & Pipe Corp.
Water Works Engineering.
Water Works & Sewerage.
R. D. Wood Co.

SELECTING DEEP WELL CENTRIFUGAL PUMPS

By AXEL O. FABRIN
Pump Designer
MEMPHIS, TENN.

PART I

ENGINEERS, scientists, in fact all men who follow vocations that are technical in character, find pleasure in contemplating great historical changes or cycles of social development.

Social developments, like history are matters of record, and in a large measure are dependent on historical changes, but aside from this companionship we find that the inventive genius of man is a fundamental requisite. It is the persistent urge to improve methods and machines that makes possible social developments which are enjoyed in our every-day life.

History of military exploits and political machinations is something we can read about in our leisure time, or we can deny ourselves this pleasure, but we cannot escape the form and degree of civilization brought about by social developments.

Water and pumps can, by reason of their importance, justify their associations with history and social development. The pump, unlike water, has not existed since the beginning of time, and it is not intended to infer that without pumps life would cease, but the pump does rightfully come into its claim of importance because it has made possible a great extension of man's activity and consequent economic progress in the production of manufactured articles, and by making fertile and agriculturally useful a large portion of the arid lands of the earth.

The Deep Well Centrifugal Pump

The type of pump known as the deep well centrifugal needs no press agent, since it is not the result of an artificially created desire, but rather is a machine designed to convey or furnish by its unique performance the most vital substance of life. Where water is procurable in abundance and can be controlled, there the density of human habitation is greatest.

Control of water delivery is best obtained through the use of pumps and, where the source of supply is

The Author

wells, the deep well centrifugal pump is almost indispensable.

The deep well centrifugal pump, as its name suggests, is designed to enter and extend down into wells where it reaches the water deep in the earth, and lifts it to the surface. (See Fig. 1.) The hydraulic member of the pumping unit is the pump body which is submerged in the well. It is suspended from the earth's surface by a pipe which conducts the water upward and this pipe includes in its extensive length a driving shaft. This driving shaft attached to a motor at the surface, transmits power in rotative form which spins the impellers located within the submerged pump body. One spinning impeller will elevate water a certain height. Two impellers will elevate water twice as high. By adding impellers any practical height or lift can be accommodated.

Pumps having two or more impellers are called multi-stage. In multi-stage pumps the space between successive impellers can be made equal to the distance each one will elevate the water. Thus, if one stage will boost water twenty (20) feet, the lowest impeller will elevate water up to the second stage, which will pick up the water and boost it twenty (20) feet higher. Five impellers spaced twenty (20) feet apart would then discharge water at the ground surface from a water level one hundred (100) feet down in the well. It has been found, however, that locating one stage immediately above another produces the same results as when they are spread apart.

Manufacturing economy and engineering reason dictate the practice of nesting impellers in an assembly of close coupled pump bodies. This assembly is the deep well centrifugal pump and constitutes one part of a complete pumping unit. (See Fig. 2.)

Part II of this article will appear in the next issue.

History

Before discussing the deep well pump, a review of the history of water pumps may prove an incentive to regard engineering on the subject more intensely.

Moving water by pumps traces its first performance to about the year 200 B.C. Previous to that period there is no mention made of pumps, and there has not been discovered any portion of history that makes reference to such a machine prior to that time.

Even the Chinese, who claim priority in many accomplishments, do not mention the use of pumps in early times, even though we consider that irrigation was common with them. Rude nations did not possess the machine, simple as it is, but resorted to laborious manual methods of raising water. From crude wells or cisterns, water was drawn by pitchers attached to cords raised or lowered by hand.

The ancient Egyptian water wheel, so common all over Asia, was turned by a stream without any appreciable fall and, at its outer circumference, was equipped with buckets which raised water and discharged it into a trough. This form of wheel appeared in Spain and was given the name of "Noria." Danish missionaries in Siam discovered a modification of the "Noria" which consisted of a wheel turned by an ass, and carrying around it, not buckets, but a band of hay which collected water and delivered it into a wooden trough.

The pump was spoken of as a cu-

riosity by the inventors and engineers of the Alexandrian School where most of the sciences were born. Hero, one of these inventors, did prepare a treatise on the expansion of steam, the slide valve, the check valve, and nearly a hundred other inventions which today would be classified under the head of "Mechanical Engineering." Strangely enough, the pump stands nearly last on the list of inventions.

It is interesting to note that, in the annual report of the U. S. Geological Survey for the year 1900, the only mention of pumps is that relating to windmills. No other means of irrigation pumping is referred to. After that year keen interest was directed to the centrifugal pump because it handled much greater water volumes than the wind-mill pump.

The development of the deep well centrifugal, capable of pumping large quantities of water from the underground water reservoirs, provided the farmers of the plains with a solution for their water problems and, as a consequence, proved a great boon to the western farmer.

It has been the writer's business as a designing engineer to investigate a great many pumping units and, in a period of thirty years, he has had to acquaint himself with performance both good and bad, as realized in all the vicissitudes and all the stages of deep well pump development dating back to a period when the machine was first accepted as practical.

Early in the period when the machine was in a relatively crude state, nothing was found more helpful in the advance towards perfection than the experiences of field men who briefly but forcefully presented them in a spirit of constructive criticism. In the light of present-day development quite a few of these criticisms have proven correct. We must not forget, however, that many promises of performance were made by the seller and they were made in a sincere desire to serve the customer, and through it all there was the hope that the designing engineer, by some method yet unknown, could provide a machine that would with fidelity fulfill every promise.

The Modern Pump

Modern design has made possible the realization of some exaggerated claims made by early exponents of the deep well pump. Through lessons learned in the hard school of experience, checked by tests in the laboratory and verified in the field, has come a method of pump design which almost justifies being categoried as a science. There is still much knowledge which at present is in the process of evolution, and like electricity we find that the phenomena of the centrifugal pump defies explanation, but does not defy control. Through experience it has been found possible to arrive at a balance between efficiency of operation and stability of performance.

For the purpose of a brief discussion, the well designed to deliver a specific quantity of water by deep well pumping can be divided into two related parts known as casing and screen. The casing, sometimes called the pump pit, extends from the surface down to some level which practice has proven best to exclude surface water or water from intervening strata yielding an undesirable quality of water. Below this casing is the screen located in the water-bearing formation.

The diameter, length, type and location of the screen depends on the water-bearing formation encountered. Geology is the determining factor in screen selection, and the well contractor best fitted to construct a well must know something of this science. Through experience, the best possible construction has proved to be that of a shutter-type screen arranged for gravel packing around its exterior to control the fine sand when maximum flow is secured from a water-bearing strata. This "gravel packed" well construction was originated by the late M. E. Layne and is now in almost universal use throughout this and other countries.

The production of water from wells of this type was much greater than that produced in the straight well, and this advance in the art of well construction naturally affected pump design.

In discussing the conditions which prevailed prior to these well improvements, we shall do well to consider in some detail the fundamental reasons for the proportions of the well and the well casing.

The well casing diameter can vary between wide limits, and the small diameter is the one which can be considered fixed. It can be no smaller than that permitting the development of the strata below, where the well screen is set. The limit for large diameters is infinite within the realm of practical economy.

Modern well construction made possible the use of the deep well

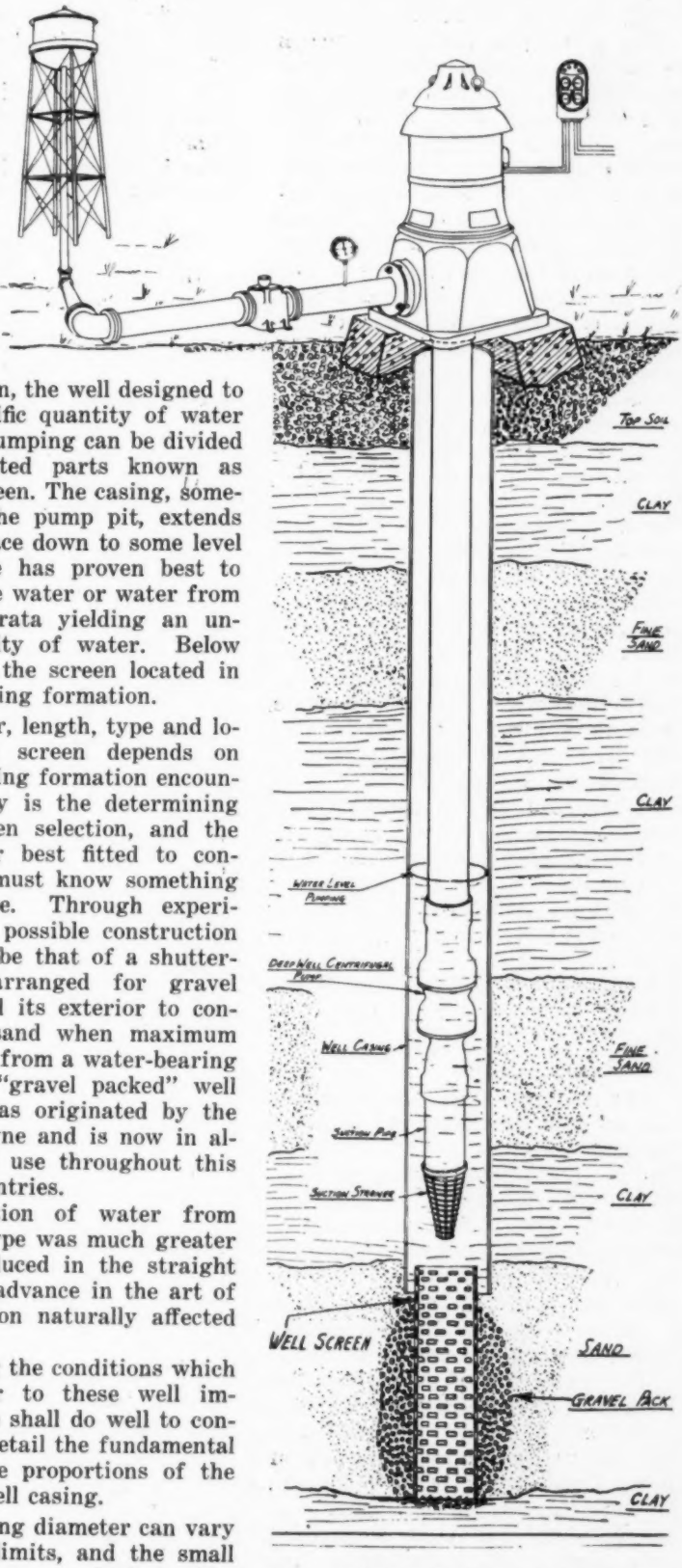


Fig. 1—Modern Well and Motor Driven Deep Well Centrifugal Pump

centrifugal pump, commonly called the turbine pump. This machine overcame the shortcomings of the conventional volute type centrifugal, which, up to the beginning of this century, was installed vertically in pits dug by hand and curbed with wood, brick or concrete.

The pump pits for volute pumps extended to a depth where the first water-bearing formation was encountered, and then bored wells were extended through the bottom of this pit to other water-bearing strata. The volute centrifugal installed close to the bottom of this pit was fitted with long suction pipes entering the bored well and was driven by open line shaft supported either from the sides of the pit or a frame extending from the pump up to the surface. Usually these pumps were driven by means of a belt and pulley. (See Fig. 3.)

Many of the dangers of such a primitive set-up accompanied by inefficient operation, were obviated by the small diameter multi-stage deep well centrifugal pump which could be lowered into a pit of relatively small diameter. The deep well centrifugal pump, because of its relatively small diameter, could be installed below the normal water level, and greater well yields were possible since the limitation of suction lifts and long suction pipes no longer handicapped the pump.

It can readily be understood that because of pump proportions the old pits were large in diameter and, though the pit and the bored well through the bottom of the pit were considered a well, in reality the well consisted of two independently related parts, and the diameter of the bore did not predicate the size of the pit.

The Pump Casing

The modern well is fundamentally divided into two parts the same as the old form, with the exception that the pump pit or casing, in reality a vertical tunnel, is small in diameter. The well casing diameter or pit is not dependent on the geology involved in securing the well yield, but it should be large enough to allow setting and placement of gravel packing around the screen.

The possession of great skill and technique, so necessary to the construction of successful wells, does not insure the same knowledge of pump proportions; but fortunately, through long exposure to water supply problems and close association with deep well centrifugals, the selection of well casing sizes has been essentially correct.

There are numerous instances, however, where something more than reliance on memories of installed units will be sufficient for guidance in determining the well casing size. This is especially true in the case where type of pump approaches the limit of hydraulic duty generally considered proper for an efficient conventional deep well centrifugal.

If, through inadvertence, the selected casing diameter is relatively small, the pump, because of space limitations, may be thrown into the mixed flow, angle flow or propeller type. These types have their place in the scheme of vertical pumps but, in cases where the total head is of any appreciable amount, they are not as economical as the conventional deep well centrifugal. Aside from the question of economics there is also the subject of the characteristics of the head, capacity and brake horsepower values, which at "shut-off" head are sometimes high enough to endanger a motor or, in the case of thrust, may at closed valve operation impose terrific overload on the thrust bearing. This is

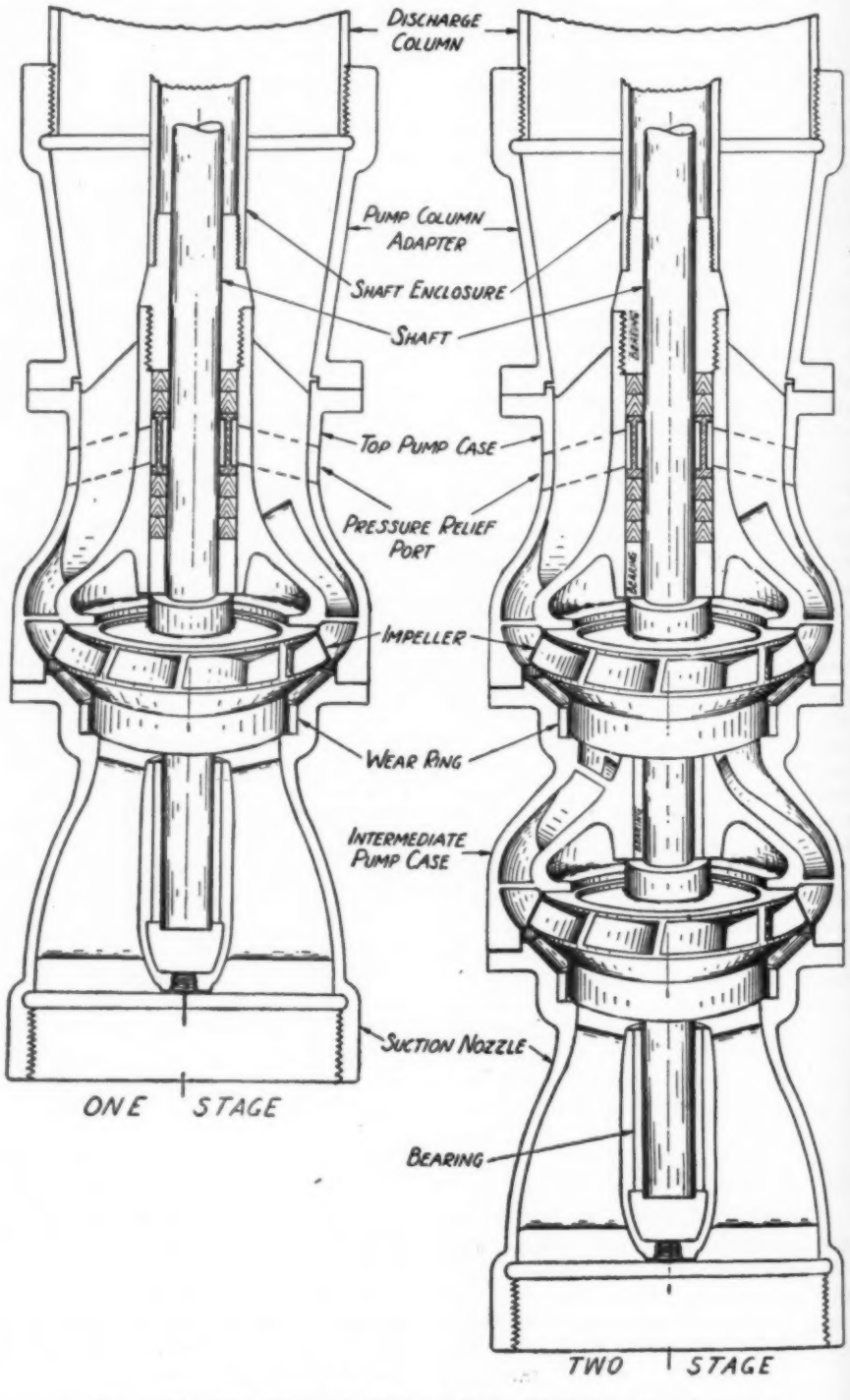


Fig. 2—Sections Through Modern Deep Well Centrifugal Pumps

especially true in the screw pump or propeller type pump.

In general, we recognize the complexity of a well water supply problem and we know that there are many features that are in themselves obscure and intricate, and that many of them have been rendered so by affected refinements. The prejudices of competition, and even the seller's own prejudices, make it difficult at times to show with clarity the genuine virtues of the object in question.

The character of the technical knowledge required for the selection of the proper water system is legible, it is true, but because of complexity it is not plain enough to enable all those who run to read.

In considering any complex matter we should examine every distinct factor in the composition, one by one, and reduce everything to the utmost simplicity.

In examining these factors it is necessary to compare the many features in a prospective water supply with those of a similar size and type already installed, and also with those of a dissimilar type, because discoveries may be and often are made by contrasts which would escape on a single view.

It is apparent that if all these things are true and experiences have proved them so, then the technical knowledge required in water supply problems is not of a nature which justifies snap judgment; not because the problems involve abstract reasoning, or the solutions require a comprehensive knowledge of mathematics in the degree that astronomy demands but, because of the multiplicity of factors, spontaneous judgment is liable to be erroneous.

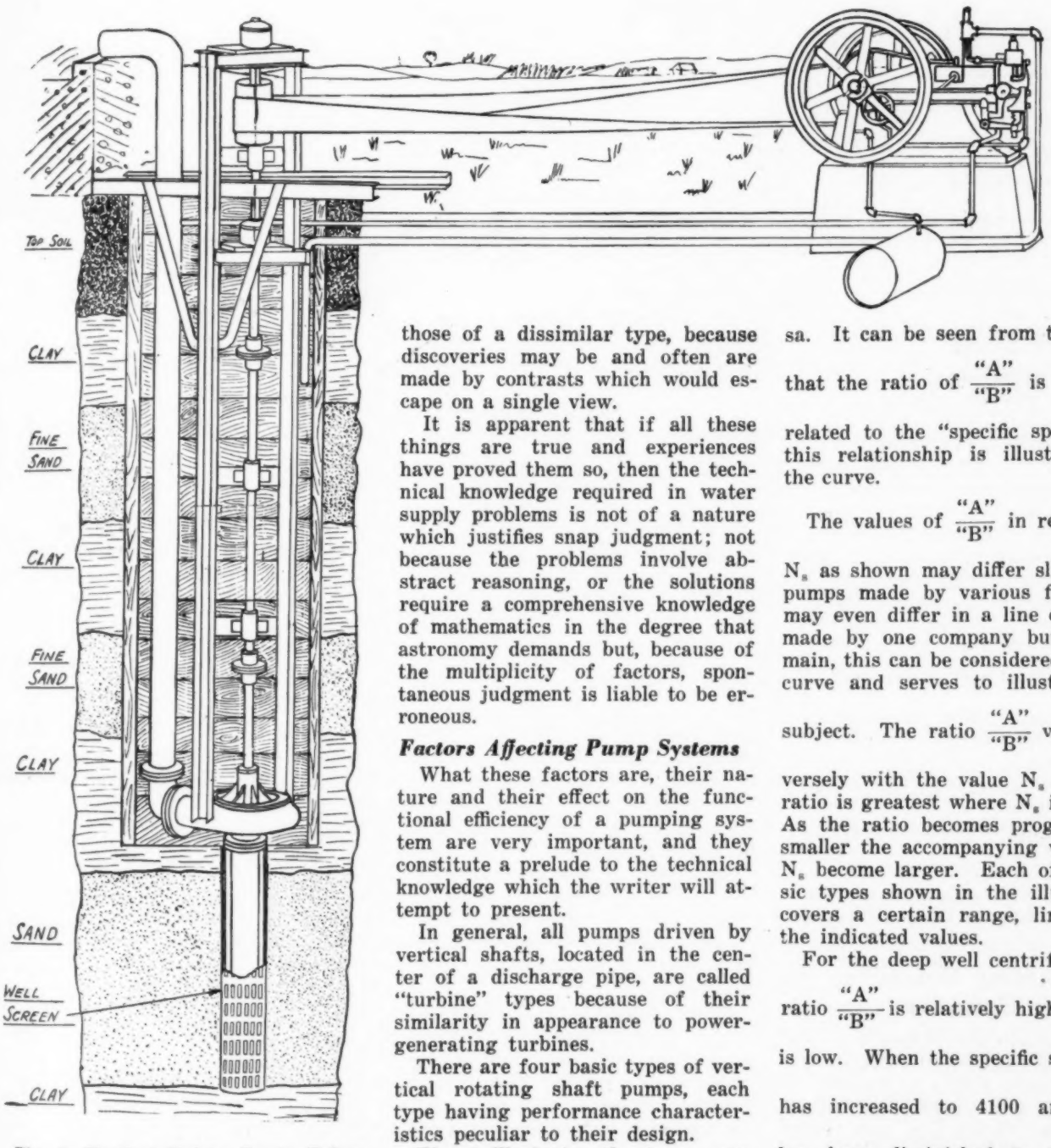


Fig. 3—Vertical Volute Pump Driven by Engine Through Belt

(Installation in Open Well Pit)

Factors Affecting Pump Systems

What these factors are, their nature and their effect on the functional efficiency of a pumping system are very important, and they constitute a prelude to the technical knowledge which the writer will attempt to present.

In general, all pumps driven by vertical shafts, located in the center of a discharge pipe, are called "turbine" types because of their similarity in appearance to power-generating turbines.

There are four basic types of vertical rotating shaft pumps, each type having performance characteristics peculiar to their design.

Fig. 4 illustrates the types, any of which can be installed in a well, pit or pond, or can be arranged for use in dry-docks or to de-water mines or drain-flooded areas. The field for which any one of the four types is best suited is noted in the illustration. The classification of type can be associated with the "specific speed" and wheel proportions. In the figure the final wheel diameter is designated by the letter "A" and the inlet by "B". Ratios of $\frac{\text{"A"}}{\text{"B"}}$ are shown as co-ordinates and the values of specific speed designated as N_s are shown as the abscissa. It can be seen from the figure that the ratio of $\frac{\text{"A"}}{\text{"B"}}$ is mutually related to the "specific speed" and this relationship is illustrated by the curve.

The values of $\frac{\text{"A"}}{\text{"B"}}$ in relation to N_s as shown may differ slightly on pumps made by various firms and may even differ in a line of pumps made by one company but, in the main, this can be considered a mean curve and serves to illustrate the subject. The ratio $\frac{\text{"A"}}{\text{"B"}}$ varies inversely with the value N_s and this ratio is greatest where N_s is lowest. As the ratio becomes progressively smaller the accompanying values of N_s become larger. Each of the basic types shown in the illustration covers a certain range, limited by the indicated values.

For the deep well centrifugal the ratio $\frac{\text{"A"}}{\text{"B"}}$ is relatively high and N_s is low. When the specific speed N_s has increased to 4100 and $\frac{\text{"A"}}{\text{"B"}}$ has been diminished to 1.25 the mixed flow type is indicated. This type of pump can be employed till

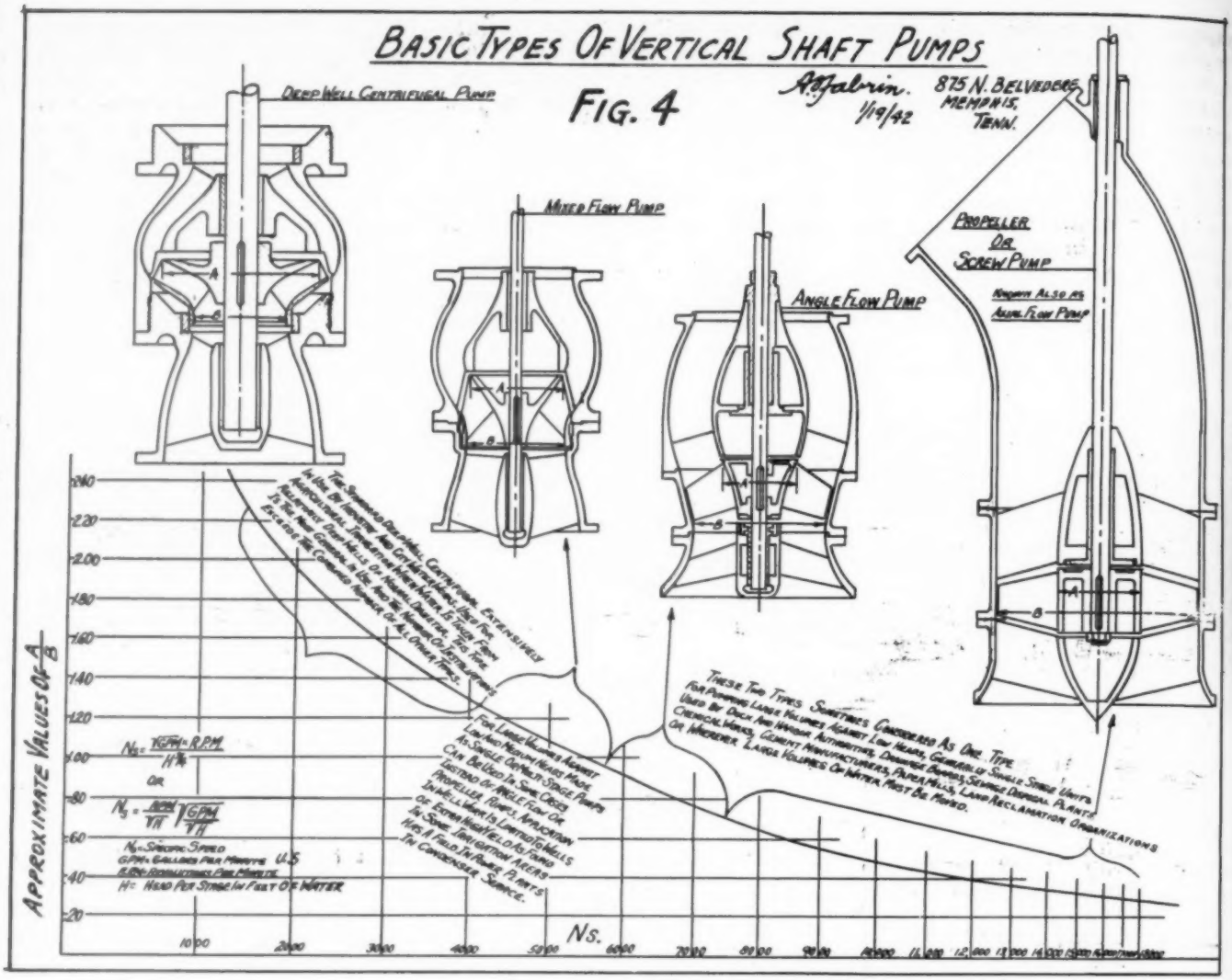

BASIC TYPES OF VERTICAL SHAFT PUMPS
FIG. 4
A. J. Fabrin. 1/19/42
875 N. Belvedere Memphis, Tenn.
Deep Well Centrifugal Pump
Mixed Flow Pump
Angle Flow Pump
Propeller or Screw Pump
Approximate Values of A/B
Ns.
These Two Types Sometimes Combined As One Type
For Large Volumes Against Low Heads
Propeller Or Screw Pump Application Is Limited To Wells Of Large Diameter
Ns = Specific Speed
N = R.P.M.
Q = G.P.M.
H = Head Per Stage In Feet Of Water

Fig. 4—Basic Types of Vertical Shaft Pumps

the N_s has been increased to 5800 where the ratio $\frac{\text{"A"}}{\text{"B"}}$ has dropped to below one. As can be seen from the figures a continued decrease of $\frac{\text{"A"}}{\text{"B"}}$ and a corresponding progressive increase in N_s indicates the next type as the angle flow and finally the largest values of N_s, and smallest ratios of $\frac{\text{"A"}}{\text{"B"}}$ terminate in the propeller or screw pump.

In a collection of deep well centrifugals of different sizes but similar design, favorable efficiencies are obtained for a certain combination of capacity, head per stage and revolutions per minute, and these three variables can be expressed in one term known as the "specific speed." The best efficiency is realized when the singular value of N_s is 2500, and pumps will be relatively less efficient when designed to operate either above or below N_s 2500.

The formula used to derive the "specific speed" is given on Fig. 4, but calculation will not be necessary since charts covering capacity and head for various revolutions per minute show the value N_s.

Though the figure covers four types, the subject under discussion is the deep well centrifugal, and the other types are presented as illustrations only.

While the most favorable designs on deep well turbines are realized at specific speeds around 2500, it will be noted that the complete range for design is from a minimum of 1500 N_s to a maximum of 4100 N_s.

(Part II, describing details of the method of selecting deep well centrifugal pumps to attain optimum efficiency, will appear in the next issue.)

Coordinating Committee on Corrosion

At the sixth annual meeting of the American Coordinating Committee on Corrosion, Frank L. Laque, Development and Research Div. of International Nickel Co., was elected Chairman, Dr. George H. Young of Mellon Institute was named Vice Chairman, and George W. Seagram, also of Mellon Institute, was elected Secy-Treas.

The Coordinating Committee, with offices at 4400 Fifth Ave., Pittsburgh, Pa., was organized in 1938 to serve as a clearing house and coordinating agency for information on American experience and American work in progress in the field of corrosion and corrosion prevention as well as to exchange information with similar foreign agencies. The committee is composed of official delegates from seventeen technical organizations, societies, or associations including AWWA.

Sub-committees have been studying the following: Under-water paints, marine corrosion, standardization of corrosion test materials, and standardization of corrosion terms and symbols.

NEW ENGLAND S.W.A. FALL MEETING HELD IN WORCESTER

By HARRY A. FABER*
Editorial Associate

MEMBERS of the New England Sewage Works Association met in Worcester, Mass., for a busy one-day session. New officers were elected for the coming year and a full program of technical papers was presented. The official registration was 85.

Presidents

Incoming	Retiring
Frank L. Flood *U. S. Engineers* *Boston*	*Jos. A. Muldoon* *Supt. Sewerage* *Bridgeport, Conn.*

At the noon luncheon the Hon. William A. Bennett, Mayor of Worcester, commended his Chief of Bureau of Sewers, John H. Brooks, Jr., as typical of men who make their city click. He described the war-time contributions of the city and pointed out that the industries of Worcester had received more "E" awards than any other New England city. President Joseph A. Muldoon announced the deaths of two association members, Samuel Ellsworth, Consulting Engineer, Boston, and Willis E. Carey, Worcester Bureau of Sewers. There was a silent period of standing in honor of each.

The Sewage Plant Operators' Annual Report Awards were presented as follows: 1st Award to John Brooks, Worcester, Mass.; 2nd Award to John Syzmanski, New Britain, Conn.; 3rd Award to Paul Flemming, North Adams, Mass. It was pointed out that modest John Brooks had insisted the award certificate be made out to the Worcester Bureau of Sewers. In his acceptance speech, Mr. Brooks praised those associates whose cooperation during his 20 years in the Bureau had made it possible to maintain standards of treatment.

*Research Chemist, The Chlorine Institute, Inc., New York, N. Y.

The Permutit Seawater "Desalting" method and equipment was demonstrated by W. H. Reed, Permutit Company, New York, N. Y. He described the development of the very compact outfit which enables the treatment of seawater to provide a total of fourteen pints of potable water. Using a simulated seawater, he demonstrated the entire procedure and submitted samples of the finished product. Such equipment is now supplied as a part of flyers' life-raft equipment and has a potential use as a part of the equipment for life-boats and rafts of all ocean vessels.

Officers Elected

The entire slate of officers submitted by the nominating committee, Roscoe H. Suttie, Chairman, was elected:

President—Frank H. Flood, Cons. Engr., Boston, Mass.

First Vice-Pres.—George H. Craemer, Supt. Treatment, Hartford, Conn.

"His Honor"
The Mayor of Worcester
William A. Bennett, President
Wickwire-Spencer Corp.

Second Vice-Pres.—Thomas R. Camp, Cons. Engr., Boston, Mass.

Directors—E. Sherman Chase, Cons. Engr., Boston, Mass.; Ernest G. Fenn, Supt. Treatment, Newton, Conn.; Walter H. Brown, Jr., Supt. Treatment, Cranston, R. I.

Secretary - Treasurer—LeRoy W. Van Kleeck, San. Engr., Hartford, Conn.

Representative on the Sewage Works Federation Board of Control is John H. Brooks, Jr., Supt. of Sewerage, Worcester, Mass.

TECHNICAL SESSIONS

(Pres. J. A. Muldoon, Bridgeport, Presiding)

"Removal and Recovery of Grease from Sewage by Chlorination," by Harry A. Faber, Research Chemist, The Chlorine Institute, Inc., New York, N. Y.

Mr. Faber pointed out that a more extensive knowledge of grease removal methods and of the exact significance of grease in sewage treatment processes may improve the operation of sewage treatment processes. He emphasized the fact that a high grease content has been found to adversely affect the activated sludge process, trickling filters, and sand beds, in addition to having an adverse effect on receiving streams.

Vice-Pres. and Secy.-Treas.

Geo. H. Craemer *Sup't Treatment* *Hartford, Conn.*	*LeRoy VanKleeck* *State Dept. Health* *Hartford, Conn.*

While the usual primary and secondary treatment processes always accomplish some degree of grease removal, only a separate unit designed for such a purpose accomplishes adequate removal when the grease content of the sewage is high. Preaeration is recognized as aiding the removal of grease in subsequent primary settling units, but there is very little data to show more than a slight degree of improvement accomplished by such treatment. Studies have shown that when chlorine is added to such pretreatment, as aero-chlorination, the removal of grease with scum and especially its precipitation with the sewage solids, can be very materially increased.

Originally conceived by Linn H. Enslow, of the Chlorine Institute, the first plant scale use of such a process at Woonsocket, R. I., proved that a dose of 1.5 ppm. chlorine applied in a preaeration unit improved the recovery of scum from 2 to 4 times that normally obtained. More elaborate studies at Baltimore, Md., fully substantiated the earlier re-

sults. This process has been employed over a considerable period of time on full plant scale use at the Lancaster, Pa., activated sludge plants where studies have shown aero-chlorination, followed by sedimentation, to accomplish an 80 per cent removal of total grease. While other plants, including primary treatment, trickling filters, and activated sludge types, have been equipped to utilize such treatment, no operating data has become available.

Mr. Faber described a commercial grease recovery method also developed in New England for treating wool scouring wastes. This process utilizes chlorine for the treatment of these wastes, which contain from 1 to 4 percent of grease, and provides a method of removing over 95 percent of the grease. The procedure involves the application of a lime-chlorine solution to the concentrated wastes, followed by sedimentation and filter-pressing of the sludge. An over-all recovery of 80 percent of the wool grease is accomplished. The product is sold at a premium over grease recovered by the older acid-cracking process. One large scouring mill now in operation uses such treatment to recover about 2 tons daily of this product and another mill is constructing a plant to re-

Award Winners

John Syzmanski, Sup't.
Treatment Works, New Britain, Conn.

John H. Brooks, Jr., Chief,*
Bureau of Sewers, Worcester, Mass.

Paul V. Fleming, Sup't.,
Treatment Works, N. Adams, Mass.

*(*New England Member Sewage Works Federation Board of Control.)*

cover one ton daily. The process is odorless, eliminates a serious stream pollution problem, and returns a profit. In the process, a reduction of the 5-day B.O.D. of the waste amounting to 90 per cent is attained in the economic zone of operation.

In reply to questions from the floor, Mr. Faber stated that sewage-grease had so little value as a marketable product that it had better be converted to useful gas in the digesters. The new plant for Boston is being designed to employ aero-chlorination for the combined purpose of disinfection, improved solids removal, odor control, and grease separation. In several instances pre-chlorination is effective in improving solids removed by plain settling.

In grease separation from wool scouring wastes the warmer the waste (and the fresher) the better

Programmers

Karl R. Kennison
Chief Engineer
Met. Distr. Water Supply Comm.
Boston

Harry A. Faber
Research Chemist
The Chlorine Inst.
New York

the chlorination effect when using the lime-chlorine process. The chlorine requirement averages 2 lbs. for each pound of grease recovered. The dirtier the waste the higher is the chlorine requirement.

Paul F. Howard, Cons. Engr. of Boston, who has had connection with this development at one plant, added that the degree of treatment attainable was dependent upon the quantity of chlorine used beyond the minimum for commercially effective grease separation. He reported that the B.O.D. could be reduced by even more than 90% if the stream condition demanded this higher purification seasonally. He cited data obtained in demonstration runs with the higher chlorine dosages. Such dosages had not lowered grease yields while attaining the higher oxygen demand reductions. The process thereby possessed an interesting flexibility of practical significance.

"Proposed Improvements in Sewage Disposal and Treatment in the Boston Metropolitan District," by Karl R. Kennison, Chief Engineer, Metropolitan District Water Supply and Sewerage Commissions, Boston, Mass.

Mr. Kennison reviewed several reports to the State Legislature on pollution of Boston Harbor. This is a natural recreational area but receives a daily discharge of over 250 mgd. of raw sewage, which affects the beaches and harbor. In 1939, the continuation of studies and the preparation of designs for treatment plants was authorized. In 1941, the legislature appropriated fifteen million dollars for the construction of such plants —but these are post-war projects and are contingent upon obtaining federal funds.

The Metropolitan District Water Supply Commission is now completing a number of large projects and has been delegated the job of designing and constructing the sewerage projects. First of these for the South Metropolitan Sewer System is to be the construction of the Nut Island Treatment Plant, then other treatment plants are to follow at Deer Island and at Moon Island. Design of the Nut Island plant is under way and will include one hour sedimentation, with chlorination provided during the bathing season, sludge digestion and gas utilization for power and heating. Existing submerged outlets will be utilized for discharge of effluent some 4 miles off shore in deep swift tidewater.

Sewage will enter the plant through mechanically cleaned medium screens, and will pass through grit chambers, then through comminutors from which it may be diverted to the effluent conduit in an emergency. The present bar-screen house will be used for chlorine storage and chlorine feeding equipment. The five main channels conveying sew-

Programmers

Walter Capwell, Sup't.,
Treatment Works, New London, Conn.

Walter Thompson, Sup't.,
Treatment Works, Stratford, Conn.

Joseph Doman, Supervising Engr.,
Dep't. of Public Works., Greenwich, Conn.

age to the sedimentation tanks will be utilized for preaeration, providing about 20 minutes detention and 0.1 cu. ft. of air per gal. Sludge and scum will be returned to the influent ends of the settling basins where interchangeable sludge and scum pumps will be provided. The four sludge digesters are to include two with fixed and two with floating covers. The digester gas will be utilized in gas engines for power and the engine cooling water will be employed for heating—in conjunction with the existing steam boilers. Diesel engines are provided for

auxiliary power, with heat utilization an added consideration.

It is estimated that sufficient gas will be available at all times for power, through the operation of two 500 KW electric generators. This power will operate the air compressors for sewage aeration. It is planned that the thoroughly digested sludge will be disposed of by pumping about 4 miles to deep swift tidewater through a 12-inch pipe line. However, an investigation is under way to evaluate the economics of production of fertilizer from mechanically dewatered sludge.

L. H. Enslow, Editor, *Water Works and Sewerage,* asked Mr. Kennison what consideration had been given the matter of cleaning the long sludge line. He suggested the usefulness of injection of compressed air for cleaning sludge lines and described the action of the liquid and compressed air mixture flowing through the line as producing effects of successive mild water-hammer inpingements against the pipe walls. In any case, injecting compressed air into pipe lines operating at high flow rates had been gratifyingly effective in loosening encrustrations of semi-soft nature.

Mr. Kennison stated that they had planned to use a scraper similar to the water main cleaning "go-devil," put through with 50 lbs. pressure behind it.

"Operating Staffs for Sewage Treatment Plants," by N. S. Holroyd, Keis and Holroyd, Consulting Engineers, Troy, N. Y.

Since the operation of sewage treatment plants is an important municipal function, the manpower shortage is serious in this field. A review of whether or not each employe is being used to the best of his ability might return dividends in plant morale.

Mr. Holroyd recommended that the authority of a chief operator should be established and that petty complaints should be heard in his presence or a reply should be returned through him.

The operating personnel should be determined by the requirements of a particular plant. At one community, large scum accumulations constituted a serious removal problem. Investigation showed this to be discharged from a leather plant and a fine screen was installed. The leather plant received a profit from the screenings and the sewage treatment plant could reduce its personnel.

A modern plant, maintained clean and attractive, gives standing to its operators and staff. At New London, Conn., the sewage treatment and incinerator plant is listed as one of the garden spots of the city. The certification of operators by the State Department of Health has advanced their status and provides an incentive to good work. Mr. Holroyd described the personnel requirements of several typical plants in which different types of treatment and equipment would be employed.

Chairman Muldoon commented on progress in the status of operators but stressed the desirability of a 44 hour week.

"A Modified Index for Sedimentation Efficiency," by Joseph Doman, Supervising Sanitary Engineer, Public Works Department, Greenwich, Conn.

In primary treatment plants most operators utilize the settleable solids test for judging the quality of effluent or sedimentation efficiency. Mr. Doman showed, however, that the percentage removal figure may be very misleading because of variations in sewage strength, in volume of flow, and in the content of industrial waste. He demonstrated the difference in the settleable solids removal from four different treatment plants.

A modified index for sedimentation efficiency, to evaluate both per cent removal and ppm. removal was suggested. This sedimentation index would actually be a sum of the per cent solids remaining in the plant effluent plus the ppm. solids remaining. The author showed that (at least for his four plants) this computation provides a satisfactory index of operating efficiency.

While the sedimentation index thus calculated is a purely arbitrary number, it permits an operator to establish a standard of effluent quality and of plant performance.

Warren J. Scott, State Sanitary Engr. of Conn., commended this proposal as a study in the right direction. The strength of the effluent certainly should be taken into account, but difficulties arise in the case of interstate compacts which call for a 60 per cent removal of suspended solids. In reply, Mr. Doman said this was intended only as an index of individual plant efficiency and that its principal use would be as an aid in plant operation.

"Bob" Mannheim, Distr. Mgr., Mathieson Alkali, Providence

W. H. Brown, Jr., Sup't., Treatment Works, Cranston, R. I.

Fred S. Gibbs, Distr. Mgr., Wallace & Tiernan, Boston

Walter J. Shea, Chief Engineer, R. I. Dept. Health, Providence

Roy S. Lanphear, Sup't. Treatment Works, Worcester

Roy E. Sweeney, Distr. Mgr., U. S. Pipe & Fdy., Boston

Willis J. Snow, San. Engr., State Water Comm., Hartford

Forum on Federation's Committee Report on "Qualifications of Sewage Treatment Plant Operators," conducted by LeRoy W. Van Kleeck, Chairman of Committee, State Department of Health, Hartford, Conn.

The report of this committee was published under the above title in the November 1943 issue of the *Sewage Works Journal,* and Mr. Van Kleeck conducted this forum in order to establish the consensus of opinion of the New England Association prior to the National Federation meeting this month in Pittsburgh.

Considerable discussion was forthcoming, particularly on the question of salaries. Mr. Van Kleeck pointed out that certification or licensing will tend to raise salaries but that the committee feels too many variables exist to permit the setting of standard salaries or even of relative rates. It is also recognized that civil service may consti-

tute a valuable adjunct to certification.

Roy S. Lanphear, Supt. of Treatment at Worcester, noted that certification was primarily intended for qualification of operators and was not to apply to compensation. Mr. Van Kleeck stated that the committee was set up to consider qualifications only, and Mr. Scott advised keeping the two matters separate. But, Messrs. Flood and Enslow pointed out that salary matters are important for the National Federation to consider since, if left to local sections, considerable weight of the "standards" will be lost. Mr. Enslow thought that local sections should develop a pattern which the National Federation can put to use.

"Plant Beautification," by Walter Capwell, Supt. of Sewage Treatment, New London, Conn.

Hardly can we do justice to Mr. Capwell's talk on how he at New London has changed an ordinary small city sewage treatment plant into a spot listed by the Garden Club of New London as a MUST on the list of noteworthy gardens. One of the chief reasons why this black-and-white word picture is inadequate is the fact that Mr. Capwell is also adept at color photography and his vivid color slides told the story with but few words.

Mr. Capwell said that his idea was to attract the public to the plant, and that flowers, for looks and for giving away, couldn't be beat as a method of securing public interest in such a non-glamorous thing as the town's "back-house." He had taken charge of the plant without previous experience or conceptions, so he had no inhibitions and only an interest in showing what could be done with plenty of free fertilizer, a Royer Shredder to put the sludge cake into condition, and ample "rich water" to make things grow.

The local newspapers helped materially by printing glowing stories about the plant and grounds, resulting in 300 to 400 visitors on Sundays and holidays. He also got authorization to do a modest amount of paid advertising in the papers. Garden clubs in the vicinity marvelled and spread the word.

What did it cost? Just $14.75 in 1944 for seed and materials and the 25,000 plants grown from seed, planted out and cared for required only the work of two old city employees, 65 and 70 years old. Few people realize that a 25c packet of zinnia seeds will produce 300 to 400 plants. He pointed out the need for a cold-frame for starting plants early, but even in Connecticut zinnias and marigolds may be planted outside as early as April. He advocated cannas and other similar hardy flowers, a variety of zinnias producing the most showy combinations. Stick to the easiest flowers to grow and call on the imagination for combinations and arrangements —that's the formula for success and economy, says Capwell.

The New London plant has a lily pool, too—just by accident. An old concrete boiler pit was found on the grounds. It was uncovered, excavated, found to hold water, and converted into a lily-pool. For "atmosphere" a rustic arch bridge was thrown across.

This year Mr. Capwell has developed a grounds fund, representing income from the sale of salvaged materials from the city's rubbish incinerator. Now, with this fund, shrubbery is being purchased on a pay-as-you-go plan. The first real investment will be $40.00 in trees and shrubs for 1945.

The moral from this story? Do a little "Capwellizing" in connection with your plant—water or sewage. Then profit from the results.

"Use of Filter Alum in Dewatering Digested Sludge," by Walter Thompson, Supt. of Treatment, Stratford, Conn.

Mr. Thompson explained how the use of filter alum (sulphate of alumina) enables the Stratford plant to dewater and remove sludge from open sand beds in 8 days as against 20 days without this chemical aid for clotting the solids and speeding the drainability of the otherwise colloidal sludge. He noted that with alum added the sludge loses its free water rapidly because the solids are floated by the carbon dioxide gas liberated. It dries out more rapidly because of the increase in number of cracks because of the smaller checker squares of the sludge cake. Another factor is reduced odor during sludge draining and the drying period.

The equipment required is simple —a solution barrel or tank and feed hose. For the important flash mix the alum solution is dropped into a tee in the sludge line just before reaching the drying beds. The alum solution is made up by dissolving 2 lbs. of alum in each gallon of water. The dosage found ample and most economical at Stratford is at the rate of 400 lbs. to the 70,000 gallon charge of sludge to the bed —i.e., 5.7 lbs. per 1,000 gals., at a cost of 11 4/10 cts. per 1,000 gals. for the chemical purchased in 100 lb. paper bags at $2.00 per hundred.

Frank Flood, of Boston, recorded the fact that alum has been used at the Toronto, Ont., plant for 10 years with good results in dewatering digested, activated and crude sludge.

R. M. Donnelly, Supt. of Mt. Standish, Mass., related that he had used powdered alum in dry form, applying the powder at the rate of 3 lbs. per 1,000 gals. of sludge, the addition being made at a point of splash mix as the sludge spills into the drying bed.

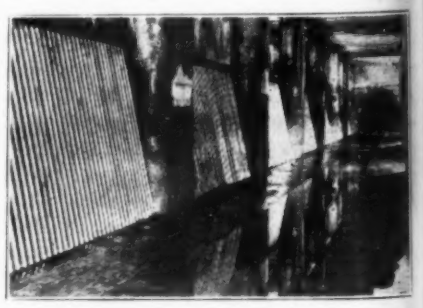
(Adjournment)

George Schroepfer Consultant to Office of Chief of Engineers, War Dept.

George J. Schroepfer, Chief Engineer and Superintendent of the Minneapolis-St. Paul Sanitary District, is now serving as a part-time consultant to the Office of the Chief of Engineers, War Dept., Washington, D. C., in the preparation of a technical manual on "Preventive Maintenance of Army Water and Sewage Plants." Information to appear in the manual is being drawn from all modern sources and periodicals.

Washington Uses Iron Pipe Screens

In trash racks designed by the Public Works Department of Washington, D. C., wrought iron pipe is used in place of the usual bars. These racks serve to keep the debris of the city's storm water sewers out of the Anacostia River, and were installed this past spring prior to the rainy season.



WARTIME RECONSTRUCTION OF WATER TREATMENT WORKS AT WILLIAMSON, N. Y.

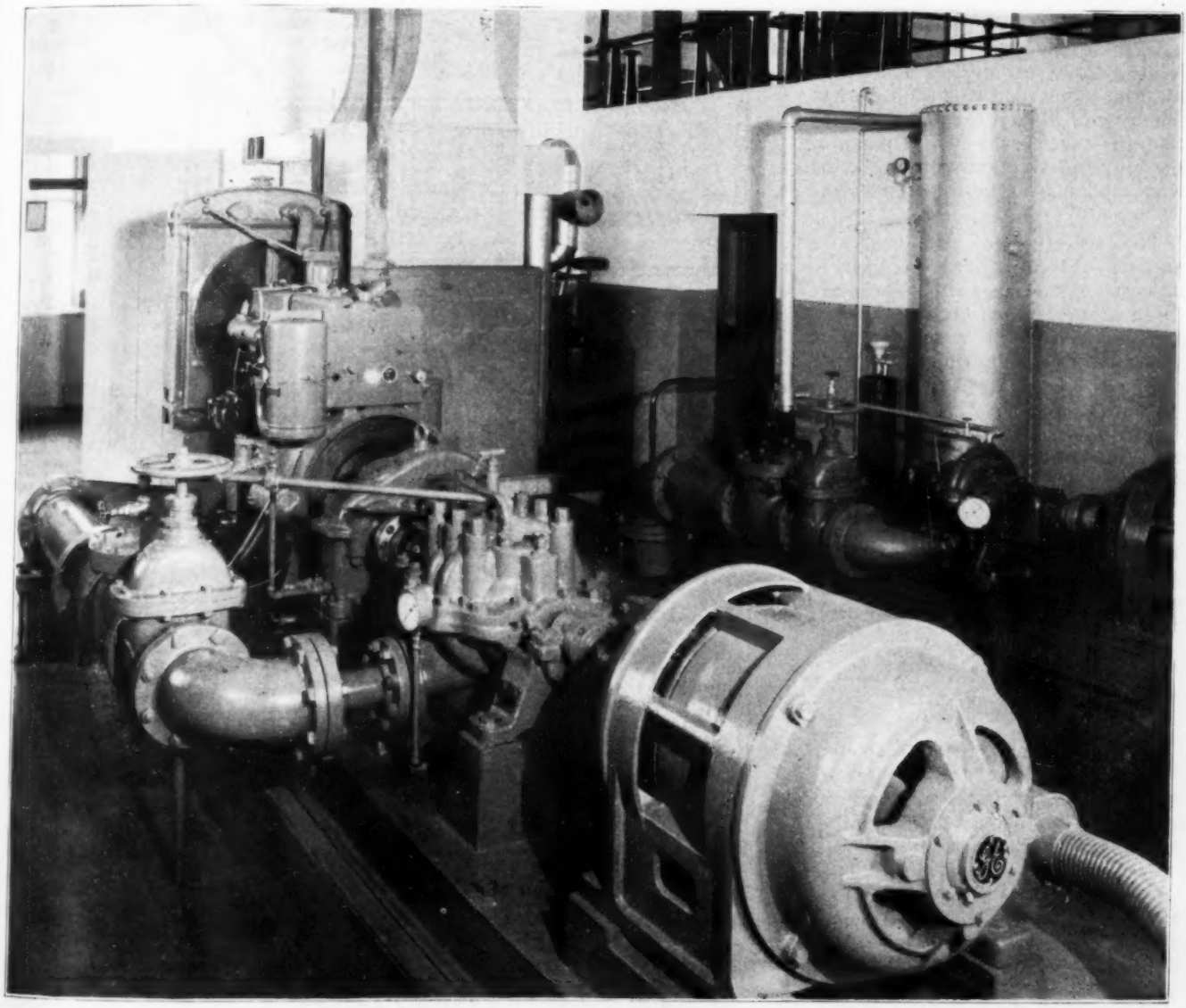
By A. BRADFORD SQUIRE
William S. Lozier Co.
ROCHESTER, N. Y.

TO KEEP pace with the wartime demands for water by its canning industries, Williamson, N. Y., has enlarged and remodeled its water treatment plant. The modernized plant includes the latest features of filter plant design, and its successful operation will serve as a useful guide to other communities planning post-war waterworks improvements.

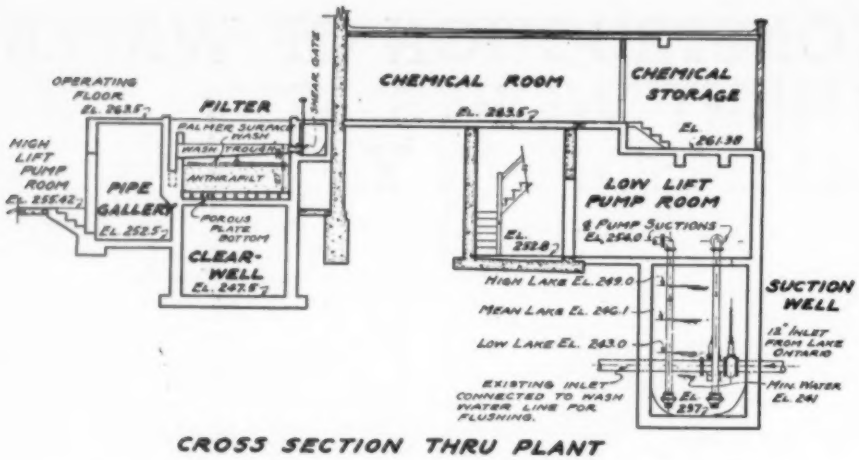
The Author

The Williamson Water District

The Williamson Water District was created in 1913 to supply water to the unincorporated community of Williamson, which is located in Wayne County, N. Y., about 5 miles south of Lake Ontario and 30 miles east of Rochester, N. Y. The community is the center of a rural area devoted to fruit and truck farming. In 1914, when the waterworks was built, a population of 950 was served by the district. Since that time the population has been considerably increased, and the area supplied by the waterworks greatly enlarged. Three



New High Lift Pump with Motor Drive and Emergency Multi-fuel Engine
(Second high-lift pump in background)



CROSS SECTION THRU PLANT

Cross-section Through Plant

Source of Supply and The Old Plant

Williamson takes its water from Lake Ontario at Pultneyville, N. Y. The original waterworks consisted of a 12-in. intake extending 600 ft. into the lake, a filter plant and pumping station with a designed capacity of 400,000 gpd., a 10-in. supply main 4½ miles long from Pultneyville to Williamson, a distribution system of 4, 6 and 8-in. pipe in Williamson and a 500,000-gal. reservoir on a hill south of the village.

The water treatment at the filter plant was provided by two settling

adjacent communities in the Town of Williamson were added to the system in 1924. Ten years ago, in 1934, the population was estimated at 3,000. In the last decade two additional extensions in the town have been made, and in 1941 the adjoining Town of Marion abandoned its own supply and was connected to the system. Today, the area supplied contains the most populous parts of the towns of Williamson and Marion with a population between 4,000 and 5,000.

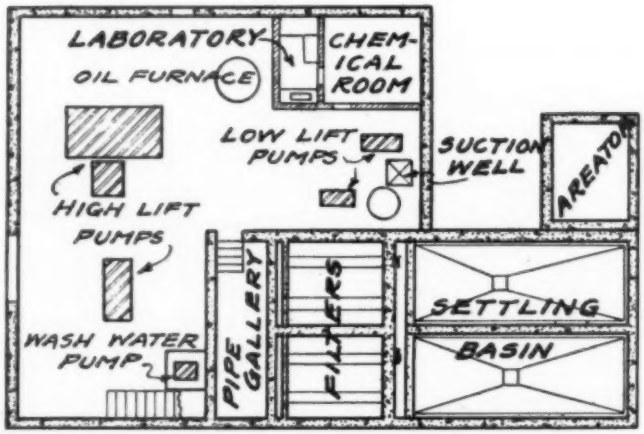
The waterworks also serves a number of enterprises engaged in processing food products. There are three canneries and three cold storage plants at Williamson and East Williamson; and two canneries, two cold storage plants and a vinegar works at Marion. A considerable quantity of water is sold to farms to supplement their farm supplies for watering stock and irrigating crops.

Since 1939, the demand for water from the Williamson plant has increased rapidly. The amount treated and pumped each year was as follows:

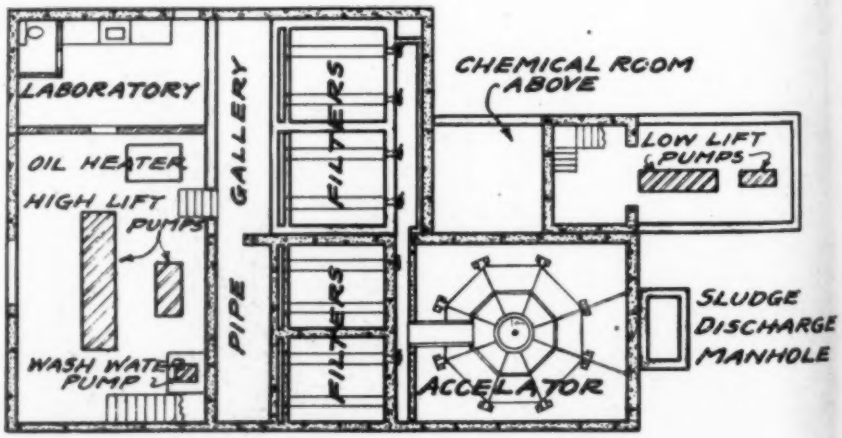
1939	44,000,000 gals.
1940	53,000,000 gals.
1941	79,000,000 gals.
1942	97,500,000 gals.
1943	91,000,000 gals.

The increase in water consumption results from the greater requirements for water of the food processing industries to meet their wartime needs.

The daily demand for water varies greatly because of the seasonal nature of the industrial operations. In the winter months, the water consumption seldom exceeds 200,000 gpd. During the canning season, in the summer months, the water consumption increases 500,000 gpd.

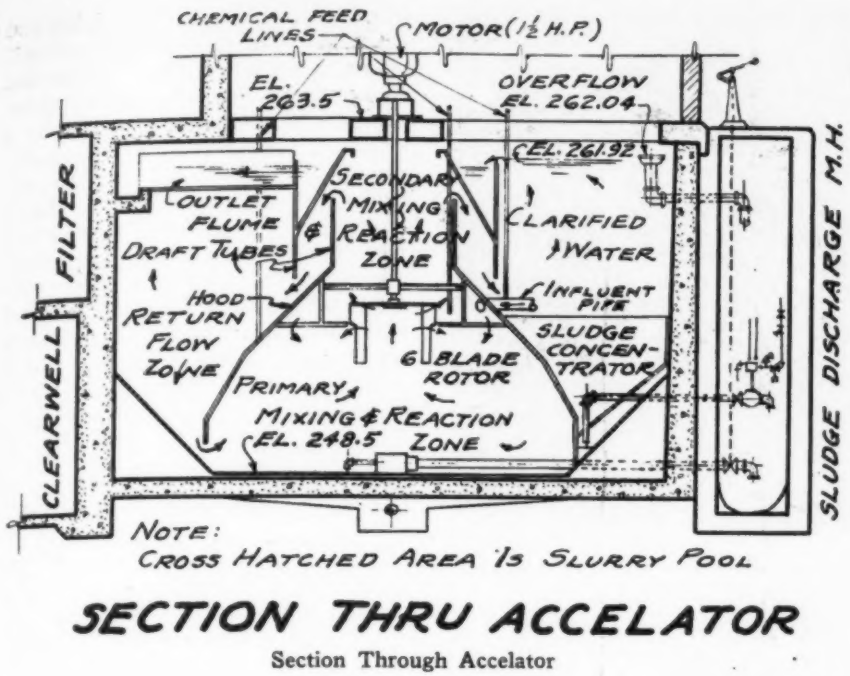


PLAN BEFORE ADDITIONS



PLAN AFTER ADDITIONS

Plan Before and After Additions



Section Through Accelator

basins, each of 33,000 gal. capacity, and two gravity rapid sand filters discharging into a clearwell of 11,000 gal. capacity. Each filter had an 18-in. sand bed overlying an 18-in. layer of gravel with a patented under-drainage system. A combination air and water wash system was provided. The pumping equipment consisted of one 300 gpm. centrifugal low-lift pump, which raised the water from the lake to the settling basins, and a 300 gpm. triplex high-lift pump which raised the water from the clearwell to the reservoir. The low-lift pump was driven by a single cylinder oil engine which also operated the air pump. The high-lift pump was driven by a large Diesel engine.

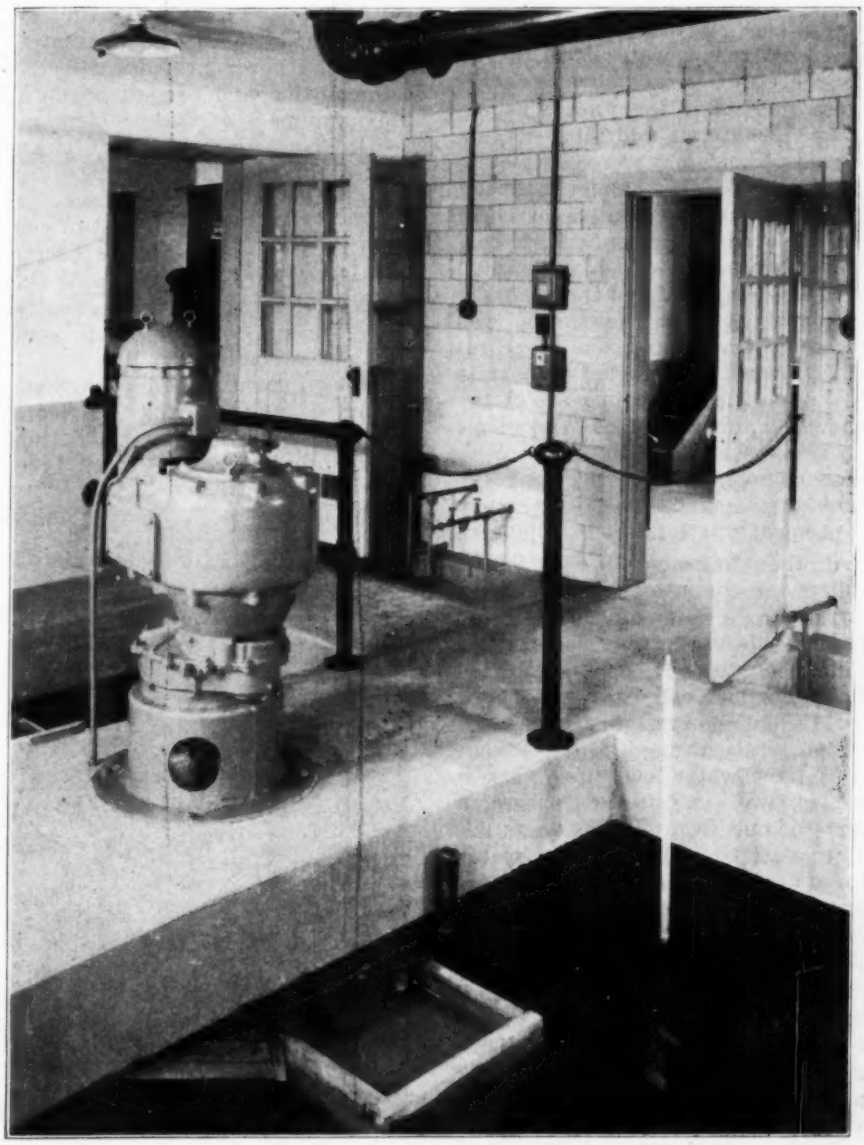
From 1914 to 1932, the waterworks was administered by a separate water commission. The change in the New York State Town Law, in 1932, placed the Town Board of the Town of Williamson in charge. Under both administrations, farsighted policies were adopted which have permitted the expansion of the waterworks.

A number of improvements were made prior to 1932, including an additional clearwell of 45,000 gal. capacity, electric motor operated pumps for both high and low-lift, and an electric driven wash water pump to provide a high velocity filter wash.

The first act of the Town Board, on assuming the management of the waterworks, was to retain William S. Lozier Co., Consulting Engineers, to make a complete report on the condition of the plant and the finances of the water district. This report, submitted in 1934, recommended that certain improvements be made each year to the waterworks which would increase its capacity about 20 per cent to 500,000 gpd.; that obsolete equipment be replaced; and that plans be made to double the plant capacity to 1,000,000 gpd. by 1950. On the financial side, the engineers recommended certain rate adjustments. The engineers further recommended the adoption of a program by which there would be sufficient revenue from the sale of water to pay for the cost of the required improvements, in addition to the regular maintenance and operating expenses. These recommendations were adopted by the Board.

Improvements in the System

Between 1934 and 1941, many of these improvements were made. Additional electric motor driven pumps were installed. The original



Accelator Motor with Tank Below

New Filters in Foreground. Old Filters on Right
(Supt. Lund operating controller valve)

chemical mixing boxes were replaced by chemical feed machines. A chlorinator was purchased and post-chlorination added to the treatment. The intake was reconstructed and placed below low water level in the lake. The reservoir walls were raised 4 feet, increasing the storage capacity to 670,000 gal., and the reservoir covered. The filters were completely reconditioned. The under-drainage system, which was badly corroded, was replaced by a system of perforated pipes. The wash water pipe lines were enlarged and the air wash equipment removed. New gravel was placed in the filters and "Anthrafilt" (crushed and graded anthracite coal) was substituted in place of the sand. A Palmer Surface Wash Unit was also installed in each filter. With these changes, the capacity of the plant was increased approximately 20 per cent to a total of 500,000 gpd.

At the time the Marion Water System was connected to the Williamson System, a pump station was constructed to raise the water from Williamson to Marion. The Marion Water District had two large reservoirs. The equipment at the new station was arranged with controls, so that the water level in these reservoirs was maintained within a range of one foot. The districts are interconnected, so that the water stored at Marion is available throughout the entire system, increasing the reservoir capacity to 2,000,000 gal.

When the Marion system was connected, it became necessary to increase the capacity of the Williamson treatment plant and pumping station, at the earliest possible time, to 1,000,000 gpd. In 1941, plans were made for enlarging the plant, orders were placed, and work commenced.

Plant Improvements

In the design of the new plant, a careful study was made of the operating experiences with the old plant. The two old sedimentation basins had never provided effective sedimentation and pre-treatment. A study was made of this problem and the Infilco "Accelator" equipment selected for the plant.

The cost of this equipment was found to be less than the cost of constructing new sedimentation basins. A single unit "Accelator" is flexible in operation and provides effective pre-treatment for the lake water having a variable turbidity.

The equipment provides automatic mixing, coagulation and sedimentation in one-third the former time. In this process the raw water is introduced into a primary mixing and reaction zone of the "Accelator," where a slurry pool of pre-formed sludge and alum coagulant is maintained and kept in circulation by a motor-driven rotor. The raw water passes through this pool to a secondary mixing and reaction zone and back to the slurry pool, where the clarified water is dynamically separated from the circulating slurry and rises to the outlet. The total retention period in the unit is about one hour, and the effluent turbidity was guaranteed not to exceed 10 ppm.

New Filters

To increase the plant capacity to 750 gpm. required the construction of two new filters of approximately the same size as the existing filters. From the operating experiences with the old filters, certain design changes were made. The area of the filters and the depth remained approximately the same. However, a square unit was used in lieu of a rectangular unit. The under-drainage for the new filters was laid out using a system of porous plate furnished by the Carborundum Co., laid over channels formed in the concrete. The individual channels drain to a main drainage channel, which connects to the outlet pipe at the wall of the filter box.

The filter media lies directly on top of the porous plate and consists of 27 in. of anthrafilt. A Palmer Surface Water Wash mechanism is provided. The wash water troughs are set to give a rise of 2 ft. instead of 18 in. allowed in the old filters. The steel wash water troughs, with

Chlorinator, Rear. Chemical Feed Apparatus, Right
(Mr. Westphal, Asst. Operator at Chlorinator)

cylindrical bottoms, were designed with a somewhat greater pitch than allowed in the previous filter. Likewise, the two inlet connections to the filter are provided to give better distribution over the filters with a less loss in head.

The piping for the filters is installed so that each piece of pipe and fitting is accessible and may be removed readily.

Each filter is equipped with Simplex Rate of Flow Controller, Loss in Head Gage, and a Rate of Flow Gage. Beneath the filters, a new clearwell was constructed to increase the clearwater storage to 65,000 gal.

The existing Wallace & Tiernan chemical feed machine and Wallace & Tiernan Chlorinator were incorporated in the new layout. Two new Infilco Type D dry chemical feeders were also installed. One alum feeder is connected to the primary mixing and reaction zone of the "Accelator" to mix with the slurry. A lime feeder, to provide pH correction, is connected to the clarified water outlet of the "Accelator." An additional Wallace & Tiernan Equiscale Chlorinator was installed and connected to the intake well for pre-chlorination.

In increasing the plant capacity, it was desirable, if possible, to avoid the construction of additional intake. The 12-in. intake pipe was sufficiently large to give a flow of 750 gpm. by gravity to the intake well at the plant, at normal lake levels. At times of low water, however, the losses at the screen became such that the hydraulic gradient did not permit the delivery of the full capacity of the pipe. Experiences with direct suction had been unsatisfactory, and so a siphon arrangement was made at the discharge end of the intake pipe which permitted the delivery of the quantity required.

Pumps and Pumping

The major item of operating expense in the old plant was the cost of pumping. Careful study was made in the selection of new pumping equipment. With the cooperation of the Rochester Gas & Electric Corp., who furnish the electrical power for the station, an operating program was prepared to provide for the most economical use of electricity.

In selecting the pumps, the head conditions were determined for the system when two filters are operated at 375 gpm.; three filters at 562.5 gpm.; and all four filters at 750 gpm. From these determinations, selection was made of the pumps which, singly or together, would give the highest efficiency.

For the low-lift pumps, two double suction, single stage, horizontal, centrifugal pumps were selected. A separate suction pipe in the intake well, fitted with a foot valve, is provided for each pump. The larger pump is arranged to operate at 1750 rpm., driven by either a 7½ hp. motor or a Continental gasoline engine. The smaller pump is operated at 1750 rpm., direct connected to a 7½ hp. motor. The smaller pump was selected to handle the load when two or three filters are in operation. The larger pump is designed to handle the load of the entire station.

Two new high-lift pumps were installed. These units were selected so that, together, they will handle a capacity of 750 gpm. One unit consists of a centrifugal pump operating at 3450 rpm., arranged with Poole couplings, to be driven directly from a 75 hp. motor or driven through a speed increaser by a 90 hp. Multi-Fuel Engine operating at 1350 rpm. The engine can be run with either fuel oil, gasoline or kerosene. This pump, when operated alone, has its highest efficiency at 567 gpm. when three filters are run. The second unit consists of a centrifugal pump direct connected to a 60 hp. motor operating at 3450 rpm. This pump, when operated alone, gives its greatest efficiency at 375 gpm. when two filters are in operation. This arrangement permits the operator to meet the range of demand on the system efficiently. The pumping equipment was by Ingersoll-Rand, Gould and Worthington.

The only additional structure required at the plant was an extension 10 ft. wide and 36 ft. long to the existing building. The lower section of this extension houses the intake well. The first-floor room contains the low-lift pumping equipment. The second story houses the chemical feed equipment, chemical storage room and chlorination equipment. The main building was rearranged at the same time to provide a laboratory room. A new warm air heating system was also installed, with an oil heater.

The work of remodeling the plant has extended over a considerable period of time due to wartime conditions and resulting delays in receiving equipment. Local labor, supervised by local contractors, has performed all of the construction required. The installation of equipment has been largely handled by the plant operators. At all times it has been necessary to keep the plant in operation to meet the requirements of the water consumers. Each piece of equipment was placed into service as soon as it was installed. The high-lift pumping equipment was first used in September, 1942; the low-lift pumping equipment and "Accelator" in July, 1943; and the new filters in February, 1944.

Improved Operation

The improved plant operation, with the new equipment, is already apparent. The "Accelator" unit is producing a water with a turbidity of 2 to 4 ppm., considerably less than the guarantee. The filter operation has improved markedly. The period between washing the filters with the new equipment runs about 120 hours, instead of former 10-hour period.

In spite of the fact that it is necessary to pump against a 10 per cent greater head because of the greater flow of water, the actual electricity used per gallon pumped has been reduced by 3 per cent. With the new equipment, it is possible for the operator to adhere closely to the carefully prepared operating schedule and to take advantage of the lowest electric rates. In 1940, 53,000,000 gal. of water were pumped at an expense of $3199.50; in 1943, 91,000,000 gal. of water were pumped at an expense of $2762.50. In other words, for 12 per cent less money, the plant is now pumping 80 per cent more water.

In the same period, the overall cost of operating the plant, including treatment and pumping, has dropped from $130.50 per mil. gal. to $93.80 per mil. gal.

Williamson has adhered closely to the financial program set out in 1934 and, as a result, is paying for the improvements entirely from water rents without recourse to taxation. The actual water rates in the community compare favorably with those of neighboring communities who pump and treat their water.

The successful construction of this improvement has only been possible because of the active interest of the local officials. Supervisor Leslie Blake and the members of his Town Board and Mr. Stanley Petty, Town Clerk, have worked untiringly to secure the necessary labor, materials and equipment to build the job. This necessitated many trips to Washington, and elsewhere, to secure the proper priority ratings. They played an active part in recruiting labor for the job and in searching the local area for the necessary construction material. Mr. Raymond Lund, Waterworks Superintendent, and his assistant are responsible not only for the successful operation of the plant, but the installation of the equipment. The plans were prepared and the work supervised by William S. Lozier Company, Consulting Engineers, Rochester, N. Y.

NORTH DAKOTA WATER AND SEWAGE WORKS CONFERENCE

Holds Sixteenth Annual Meeting at Bismarck

A Report by
KENNETH C. LAUSTER*
BISMARCK, N. DAK.

THE North Dakota Water and Sewage Works Conference Sixteenth Annual Convention held in Bismarck, September 12-13, concurrently with the Fourteenth Annual Convention of the League of No. Dak. Municipalities, was one of the most successful meetings in the history of the Conference. Approximately 100 were registered, representing thirty municipalities, three Indian agencies, and three State institutions. This attendance was by far the best coverage from the standpoint of number of cities, ever enjoyed by the Conference.

Delegates from the far corners of the State were present. Those from the greatest distances were William Robinson, Williston, 240 mi. northwest; George Larsen, Bowman, 200 mi. southwest; Gil Junge, Wahpeton, 270 mi. southeast; and P. D. Slagerman, Pembina, 360 mi. northeast, won the $10.00 prize donated by the Conference for the delegate traveling the most miles within the State to attend.

*Acting Director, Div. of Engineering, No. Dakota Dept. of Health, and Secy.-Treas., No. Dak. Water and Sewage Works Conference.

Principal Banquet Speaker
Portland, Oregon's, Mayor Earl Riley spellbinding 240 listeners with his war trip observations overseas. On his left is Mayor Churchill of Bismarck, N. D., who served as toastmaster. On his right, the Rev. G. M. Stewart, Secy. Lauster's father-in-law, who gave the Invocation.

The city of Fargo, headed by O. O. Ayliffe, Waterworks Supt., Park Tarbell, City Engr., and F. W. Pinney, Sewage Works Supt., gave its usual support with a delegation of nine representatives. The Conference accepted the invitation to hold the next meeting in the city of Fargo.

New Officers

Officers elected for the conference year were:

President—F. W. Pinney, Supt., Sewage Treatment Works, Fargo.

Vice Pres.—S. K. Svenkeson, Supt. Public Works Dept., Minot.

Secy.-Treas.—K. C. Lauster, Acting Director, Div. of San. Engr., N. D. Dept. of Health, Bismarck.

Directors—John Kleven, Supt., Sewage Works, Grand Forks; Harley Quam, Supt., Water and Sewage, Lisbon; R. J. Lockner, Supt., Water and Sewage, Cooperstown; W. H. Swanson, Waterous Co., St. Paul, Minn.

Honorary Life Members

Mr. Ora C. Ayliffe, Waterworks Supt., Fargo, completing his thirty-second year with the Fargo Water Department, and one of the charter members of the organization, was made an Honorary Life Member by

The Lively Morning Session of the First Day.

Panel of Experts

Capt. M. C. Hope, USPHS, Kansas City; Capt. Glen J. Hopkins, State San. Engr. of South Dakota; L. N. Thompson, Vice-Pres. of AWWA and Supt. of Water at St. Paul, Minn.; Prof. Elder Lium, C. E. Dept., Univ. of N. Dakota, Grand Forks; Kenneth C. Lauster, Secy.-Treas. of the Conference and State Sanitary Engr., Bismarck, N. D.; T. M. Sette, finance expert from the Bank of North Dakota, Bismarck.

the Conference. Presentation was made by eighty-five-year-old "Bill" Littlehales, the only other Honorary Life Member present. "Bill" Littlehales, Waterworks Supt. and Fire Chief of Dickinson, has held these positions for the past thirty-five years. "Bill" had to stand up the hundred miles from Dickinson to Bismarck on a bus to attend, but weathered the ordeal in fine shape and can still drive his fire truck.

Prior to the presentation of the Honorary Life Certificate of Membership, Mr. Ayliffe was completely surprised when he was drafted to present an illustrated slide lecture, based on pictures taken at the Fargo plant immediately after its construction in 1912. The slides were made available through Paul D. Haney, State Sanitary Engineer of Kansas, who had unearthed them from his files. Possession of the slides was kept a secret until flashed on the screen. Following the lecture, Mr. Ayliffe, who discharged his assignment in fine fashion, was presented with the set of slides.

Joint Banquet with League

The highlight of the Convention was the joint banquet with the League of Municipalities, at which 240 persons were present. Guest speaker, Earl Riley, Mayor of Portland, Ore., and a Trustee of the American Municipal Assoc., spellbound his audience for a full hour describing his experiences on his recent tour of the British Isles as a guest of the British Ministry of Information. Mr. Riley had an opportunity to see all phases of life in the beleaguered country, and vividly described Britain as a huge munitions factory. Relating the hardships under which the British people have been laboring, the speaker told of the rigid rationing and price control. "But," Riley declared, "Britishers are not complaining. And, when asked how long they can stand up under it, their reply is, 'Just one day longer than Hitler, dang him'."

Civil Service for Municipal Employees

Second only to Mayor Riley's address was the paper presented by Leonard N. Thompson, Vice Pres., AWWA, on the subject of "Civil Service for Municipal Employees." The topic was very timely, being presented before the joint session of the two groups on the afternoon of the first day with an attentive audience of nearly 200 persons. Mr. Thompson spoke straight from the shoulder, as only one with his broad experience can do. That his advice was well taken can be illustrated by the remark made by Myron H. Atkinson, Exec. Secy. of the League of

Ted. Ressler, Filter Operator, Bismarck (Local Comm.)

R. J. Lockner, Sup't, W. & S., Cooperstown (New Director)

J. J. Langer, Operator, Ft. Totten Indian Agency

M. L. Lovell, City Engr., Beach, N. D. (Sage of the West)

E. G. Taylor, Distr. Mgr., Permutit Co., Minneapolis

George Larson, Sup't Water & Sewage, Bowman, N. D.

Two Honorary Life Members

"Bill" Littlehales, Sup't of Water and Fire Chief at Dickinson, and Ora Ayliffe, Sup't of Water at Fargo, are the Conference's only Honorary Life Members. On left is "Bill" Yegen, Bismarck's Sup't of Filtration. In rear is "Ken" Lauster, Secy. & Treas. of the Conference.

The Fargo Delegation
(They Took Home The Bacon)
The Fargo delegation, containing the new president of the Conference and the new Honorary Members. From the left—O. C. Ayliffe, Supt. of Water; E. T. Brevik, Meter Dept.; Peder Amundson, Hydrant Dept.; Oscar Jordheim, Asst. City Engr.; H. H. Behlmer, Asst. Supt.; F. W. Pinney, Supt. of Sewerage who was elected President of the Conference. (All will be hosts to the 1945 Conference in Fargo.)

North Dakota Municipalities: "He's talking darn good sense."

Mr. Thompson explained both the merits and disadvantages of Civil Service, stating that "Civil Service, as a system properly set up and administered, is a protection to both employee and employer. It is the best system yet devised to insure a municipal government being run on a non-partisan, business-like basis. Proper administration, however, is absolutely essential." Mr. Thompson stated that a sound retirement system is imperative to good management and should go hand-in-hand with the merit system, and recommended the contributor plan for old-age retirement wherein both employer and employee contribute. To permit the small communities to participate in such a system, he suggested State legislation to set up a State plan in which they could participate; or enabling legislation to permit joint participation with other cities in the State.

Water and Sewage Works Planning

A panel discussion on the subject, "Planning for Water and Sewage Works Development and Operation," conducted by E. L. Lium, Professor of Civil Engineering, University of North Dakota, as the discussion leader, completed the joint session. Members of the panel were T. W. Sette, Bank of North Dakota; K. C. Lauster, State Sanitary Engineer; L. N. Thompson, Vice Pres., AWWA; Glen J. Hopkins, State Sanitary Engineer of South Dakota; M. H. Atkinson, Exec. Secy., League of Municipalities; and M. C. Hope, USPHS, Kansas City.

The panel was primarily designed to apprise municipal officials of the problems encountered by water and sewage works men with the hope that their interest in such work would be augmented. The general topics touched on Financing, Administration, Stream Pollution, Post-war Planning, Maintenance, Water Treatment, and Sewage Treatment.

It was brought out in the discussion that the average small North Dakota municipality, of from 400 to 600 population, would find it extremely difficult to finance a water and sewerage project for post-war construction on the basis of immediate pre-war construction costs. It was felt, however, that some of these projects could be handled in certain localities and that the majority of these municipalities could successfully finance from one-half to three-fourths of the total construction costs. Municipalities were urged to proceed with present planning for post-war construction.

Operators Schools

On the second day, Conference members were divided into three groups consisting of the Water School, for operators of water treatment plants; the Sewage School, for operators of sewage treatment plants; and the General School, for the general small town water and sewage works operators.

A lively discussion centered around the paper by William Yegen on the subject of "Stabilization of Lime Soda Softened Water by Balanced Reaction." Mr. Yegen's theory is that Missouri River water at Bismarck can be softened and stabilized by carefully adjusting the dosages of lime, soda ash, and alum so as to produce a water with equal parts of magnesium hardness and calcium hardness remaining. He supported the success of his method by citing highly satisfactory results in the length of run of hot water heating coils throughout the city.

The interesting phase of the Sewage School centered around E. L. Lium's paper on "The Effect of Potato Dehydration Wastes on Sewage Treatment Plants." Mr. Lium's experiences were based on the plant at Grafton, N. Dak., which received approximately one-fifth of its total flow in dehydration wastes. The plant is a standard trickling filter, separate sludge digestion plant, with a designed population of approximately 6000.

Mr. Lium stated that only a few days after the potato dehydration plant went into operation the effluent from the treatment plant was coal black. The plant effluent contained about 700 ppm. 5-day B.O.D. and the strength of the effluent jumped up to around 300 parts per million B.O.D.

Following complaints from down stream riparians and threatened damage suits, the Grafton City Council took action in May of this year to prohibit the potato dehydration plant from discharging its

"Here and There"

Chas. J. Coglan
Mayor
Wahpeton, N. D.

•

Emil Wolff
Water Comm.
Lidgerwood, N. D.

•

"Herb" Hintgen
Sup't Water
Wahpeton, N. D.

W. J. Bell
W. & T. Co.
Minneapolis

and

"Sig" Ravnos
Sup't
Water & Sewerage
Mandan, N. D.

Jack Turner
Sup't Filtration
Grand Forks, N. D.

and

"Ted" Lofgran
Cutler Magner Co.
Grand Forks, N. D.

wastes into the municipal sewer system, unless the industry would guarantee to protect the city from any damage suits that may arise or any damage that may result to the treatment plant, and to post a surety bond to guarantee such protection, such bond to be retroactive to the time the potato dehydration plant originally started operation and to continue active for five years in the future. The industry, failing to meet these terms, was dismantled and moved its plant to Richfield, Utah.

Elevated Tank Maintenance

The subject of "Elevated Tank Maintenance and Cleaning" was discussed at the General School. Mr. M. L. Lovell, City Engineer, Beach, N. Dak., stated that he was approached by a tank maintenance firm that desired to weld all the seams in the tank. The tank company purported that this was absolutely essential because the rust forming between the plates at the seams would gradually force the seams apart and cause leaks to develop. The sum of approximately $4500 was quoted for welding, painting, and repairing the 125,000-gal. tank. Mr. Lovell stated that the tank had been standing for some thirty years and there was no leakage; so he concluded that it would be unnecessary to throw away the city's money in this manner.

Mr. A. L. Greenlee, of the U. S. Geological Survey, discussed ground water investigations and urged the support by the Conference in obtaining legislative appropriations sufficient in amount to set up adequate ground water investigation services. He cited the necessity, for those municipalities depending upon ground water supplies, of keeping accurate long-time records of ground water levels. In commenting on the work done at Dickinson by the Geological Survey in cooperation with the State Department of Health, Mr. Littlehales, Supt. at Dickinson, stated that Mr. Greenlee had taught him more about his water supply in two weeks than he himself had learned during the past thirty-five years.

WATER AND SEWAGE DIV. OF A.C.S. HOLDS INTERESTING SESSIONS

THE Division of Water, Sewage and Sanitation Chemistry is one of the smallest groups in the largest technical society in the world (38,000), but it has a loyal membership whose attendance at its recent sessions was much in evidence.

Elected for the ensuing term were the following officers:

Chairman—Dr. C. C. Ruchhoft, Princ. Chemist, USPHS, Cincinnati, Ohio.

Vice Chairman—Prof. W. W. Hodge, Head, Dept. of Chem. Engr., Univ. of West Virginia, Morgantown, W. Va.

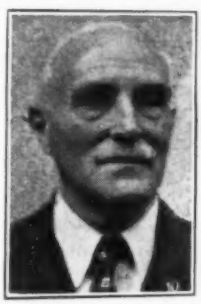
Secy.-Treas.—Miss Gladys Swope, Research Fellow, Mellon Institute, Pittsburgh.

Exec. Comm.—Dr. Willem Rudolfs, Dir., N. J. Agr. Expt. Sta., New Brunswick, N. J.; Dr. J. A. Holmes, National Aluminate Co., Chicago, Ill.

Inhibitors for Control of Scale and Corrosion

Papers on the technical and theoretical aspects of various types of corrosion preventers and scale inhibitors were presented, including information on silicate, hexa-metaphosphate, glucoside-phosphate, and septaphosphates compounds, each paper discussing the latest findings of the research laboratories which had developed the various compounds. Galvanic corrosion of steel nickel couples was also reported on.

Of particular interest at this session was the display of samples of water pipes used in test installations in army camps, and the paper discussing the comparative studies of the various inhibitor compounds both in an experimental set-up in the Sixth Service Command and in various camps. L. H. Kessler, Head of the San. Engr. Sect. of R. and U. Div. of the U. S. Army Engrs., indicated that, both in pilot plant and in plant installations, the use of septaphosphates, hexa-metaphosphates and combinations of silicate and phosphates had proved efficacious.



Division Chairmen

(Retiring) *Dr. W. Rudolfs*

(Incoming) *Dr. C. C. Ruchhoft*

Industrial Wastes:

A comprehensive and well-organized program for both the study and abatement of industrial waste pollution in Connecticut was presented by Wm. S. Wise, Ch. Engr., Conn. State Water Comm. Other states could do well to follow the lead of Connecticut.

Dr. Harry W. Gehm, Tech. Adviser to the pulp and paper industry's National Council for Stream Improvement, explained how the return for reuse of 75 per cent of the white water waste in the paper industry made a sufficient saving in heat to more than offset the cost of treating the white water to remove most of its load of fibers and waste.

Treatment of pickle liquor with limestone, the determination of sulfite waste liquor, and the determination of TNT wastes colorimetrically, completed this symposium.

New Ideas

Outstanding paper of the session dealt with the use of Chlorine Dioxide as a treatment for the removal of chlor-phenol tastes and odors in water supplies. The experimental studies and subsequent adoption of this treatment at Niagara Falls, N. Y., with a reduction in cost of chemical treatment were explained. The chlorine dioxide is introduced after filtration by adding an excess of chlorine to a solution of sodium chlorite which is easily fed through a slightly revised chlorinator. This work is a development of the Mathieson Alkali Works.

Another new idea developed by Drs. Gail Edwards and L. R. Setter, of N. Y. City Dept. of Pub. Works, is the vacuum cleaning of air diffuser media without removing the plates. After vacuum cleaning, the plates are subjected to an air blowing for some time. The result of these two treatments combined is better than either singly, and far better than caustic soaking.

Water and the future industrial development in North Dakota, the determination of phenols, and the application of activated carbon to improve the palatability of waters were also presented as papers and discussed at the meeting, but space does not permit printing of digests of these.—(G. E. S.)

MORRILL REPORTS ON ADDIS ABABA

(And It's Now Colonel Morrill)

In our April issue a news item in "Here and There", said that Lt. Col. Arthur Morrill would soon be on his way to Ethiopia after which he would go to China. A recent letter dated July 18, indicates that Art. Morrill, formerly Supt. of Sewage Treatment at Detroit, is now a Colonel, and is attached to the American Legation in Addis Ababa, Ethiopia, where he expects to remain until about Nov. 1. Col. Morrill's letter (the most recent in a personal correspondence) is so interesting that it seems it must be shared with the readers of Water Works and Sewerage. We trust that Art. Morrill will not object to this sharing of the mail. —(G.E.S.)

Col. Morrill

"Dear Doc: I started to write you from Miami Beach two months ago. But that very day we were 'alerted,' that is told to be ready to take off on short notice, and after that we were not allowed to send letters or telegrams or make telephone calls. The next morning we flew out to sea before daylight and ten days later I was in Cairo. June 14 I arrived in Addis Ababa.

"There is so much to tell about this country that I hardly know where to start. For one thing it is not hot, at least not in Addis Ababa at nearly 8000 feet elevation. It is now the rainy season and one of the problems is to keep warm, as most of the buildings have no provision for heating.

"It is not nearly as wild and barbaric here in Ethiopia as I imagined. There are places, as in our West a hundred years ago, where it is a good idea to have a gun. There are other places, however, where people wear dress clothes to dinner parties, and where an Italian medical scientist works in a modern laboratory and studies small disease-transmitting flies under a microscope.

"The Italians murdered a lot of educated Ethiopians, but they also did a tremendous amount of worthwhile work in the five years before they were chased out. We hear stories of bad engineering and wasteful expenditures under the Fascists, but I have not really investigated enough myself to know whether any of them are true.

"Somebody sold them ozone treatment for the filtration plants of Addis Ababa. From our American point of view this looks like a goofy idea. It might not look so silly if there were no war and you could get spare parts, supplies, and repair men from Italy but, as it is, it seems pretty foolish to have such a tricky process in such an isolated country. They ran out of some fancy chemical that was necessary to dry the air that went into the ozonizers. The damp air put the machines out of commission so they had to put in emergency chlorination anyway. European engineers seem to see a lot more objection to chlorine than we do, and so go to great lengths to avoid it. The same thing was noticeable in India.

"The Addis Ababa filtration plant is very small, compared with the size of the city. I don't have the figures handy, but the water leaves the plant in four three-inch pipes and the population must be nearly 100,000. The city engineer is a Russian and the water engineer an Italian and they seem to know their stuff. In spite of the cruelties of the war, it is surprising how little resentment there seems to be against ordinary working Italians.

"After the re-conquest the British army evacuated a great number of Italians, but now they are being brought back, if they have not been taken too far. In a country where so few people can read and write and use a screw-driver these Italians are badly needed for all kinds of mechanical work. There are Greeks and Armenians here, and many other nationalities, but the supply of mechanics would be very low if you took away all the Italians.

"June 29 I started an 11-day trip along the railroad (the only one in Ethiopia) to Jibuti in French Somaliland. Jibuti is on the Gulf of Aden, close to the south end of the Red Sea, and has the distinction of having the worst climate, or one of the worst, in the world. It is very hot and often very humid, and French Somaliland is a rocky, hilly desert. They found brackish ground water 5 miles from the city that makes a little cultivated oasis and supplies the city with water, but generally the country is pretty barren. There is 1750 ppm. of NaCl in the water, so it doesn't taste very good straight. There seems to be enough of it, however, and the salt comes from the land side, not from the sea.

"The last hundred miles or so of Ethiopian territory is semi-desert country, where the scanty population is of nomadic Somali herdsmen. We saw quite a few camels and hundreds of goats and black-headed sheep. It is a wonder where they find enough to eat, as the scattered tufts of grass look thoroughly dead and there isn't much other vegetation except thorn bushes. In between the tufts of grass the soil seems to be bare, clean sand, with not a speck of fertility to it.

"At rare intervals there are terrific rains in that country and there is some water in the ground. At some places the Somalis can get water for their herds by digging holes five or ten feet deep in the sandy bottoms of the dry wadis.

"At one of those I saw a curious 'one man-power' pump. One Somali was down in the hole with a little conical metal bucket that held about a gallon. He would dip it in the water at the bottom of the hole and then throw the bucket, water and all, up to another man on top who poured the water into a trough so that the goats could drink. If my film comes out all right I may be able to show you a picture of that operation some day. . . . . Sincerely, Arthur Morrill."

SOLVING A SEWAGE PUMPING PROBLEM

By W. W. GLOVER
Chief Engr.
SIMPLEX VALVE & METER CO.
PHILADELPHIA, PA.

THE continuous and satisfactory service of sewage pumping units is very frequently affected by alternating pressure and vacuum conditions, due to automatic pump starting and stopping. This condition poses the problem of maintaining at all times the priming of the pumps. A particular case, in point, is that of the low-lift sewage pumping station at Pottstown, Pa.

At the Pottstown plant there are two pumps that deliver sewage from the low-level system, comprising approximately one-half of the sewerage system of the town, to the junction manhole approximately 1,000 ft. distant. From that point the total flow enters the treatment plant. The pumps deliver against a head of approximately 45 ft., taking suction from a common wet well in which float switches effect automatic operation. At the present time one pump has capacity sufficient for normal requirements so that the other is idle. One unit is operated for a 12-hour period during the day, while the other unit is operated the remaining 12 hours handling night flows for one week. The cycle is then alternated for the next week so that the two pump units have, in the long run, the same amount of service and the same types of flow to handle. When in service the pumping cycle provides an operating time of 12 to 15 minutes and an idle time of 6 to 8 minutes, except during the low flow hours of 12 midnight to 5 A. M., when the idle time is approximately 45 minutes.

The center line of the pump casing is at elevation 15.

The float switches are so set as to start the pump when the suction well level is at elevation 17 and stop it when the level has dropped to elevation 13. Once each day the wet well is drawn down to elevation 10.5 in order to clear it of the accumulating heavier solids. For general diagrammatic view see Fig. 1.

The Problem and Attempted Correction

Under the circumstances a vaccum is present in the pump casing a considerable portion of the time, tending to release air from the sewage or draw it in at glands and joints. Air or gas is also liberated in some amount during normal operation. It is, therefore, necessary to displace accumulating air from the pump during operation and to prevent the entrance of air during periods of shut-down and low wet well level. Such prevention was attempted by placing an automatic air release valve on each pump casing near its outlet, just ahead of the check valve (Fig. 1). Sewage with its varied makeup always presents problems to mechanical equipment, but this case was further complicated by the fact that usually there is a certain amount of grease and oil present and frequently there are large quantities of it.

The original valves were not able to cope with this condition and the result was a need for dismantling and cleaning them two or three times a day. It was also necessary to have a manual release valve for those times when the pumps had to go into service at once without permitting out-of-service time for cleaning. This was a serious problem, especially since the pumps are three floors below the operating level and the station is 1200 ft. from the main part of the treatment plant. It took much valuable time of the operating personnel to do all of this.

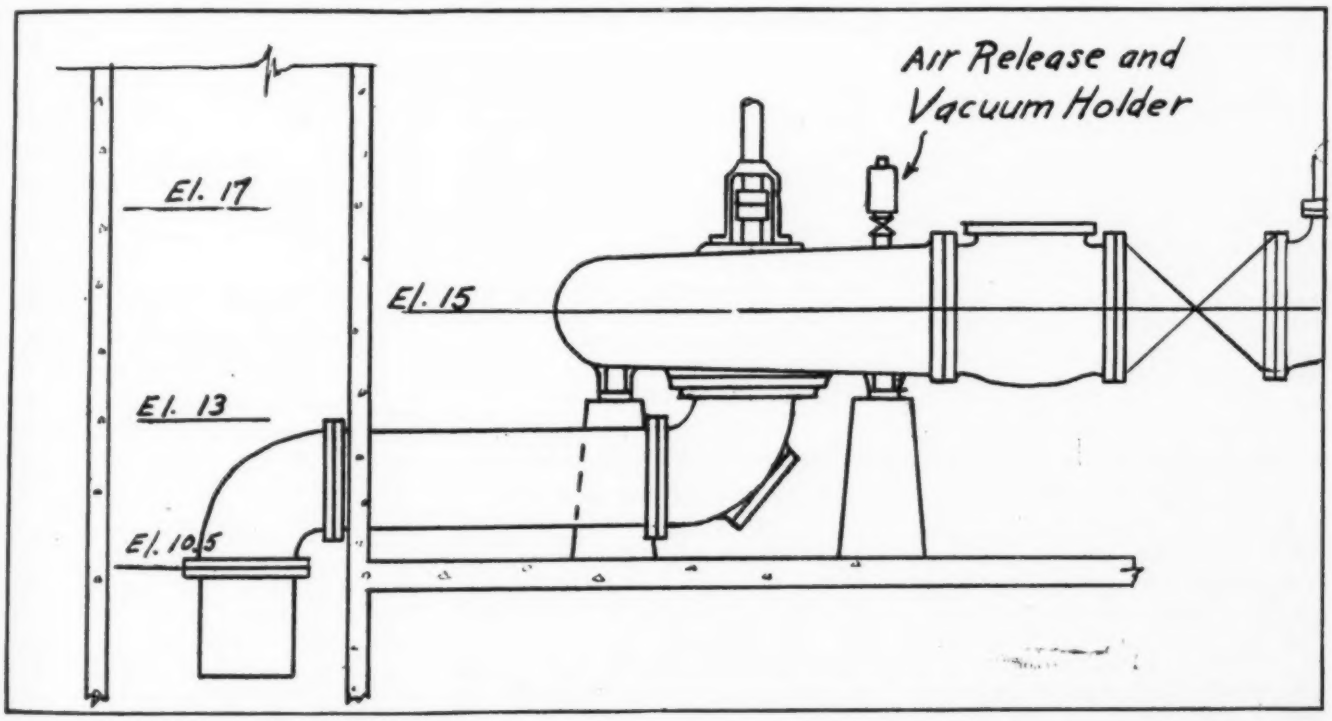


Fig. 1—Diagrammatic Sketch of Pump, Wet Well Elevations and Location of Air Release and Vacuum Holding Valve

Fig. 2—Sewage Air Release Valve Being Back Flushed
By Eugene B. Swinehart, Sup't., Pottstown Sewage Treatment Plant

Problem Solved

The problem was presented to the writer's company and it was recommended that a Model B Simplex Sewage Air Release Valve be installed in these locations. The valves were located in the same place (Figs. 1 and 2) as the original valves and serve under the same operating conditions. These air release valves have now been in service for several months and are giving entire satisfaction. Not once in this period have the pumps lost their prime. On one occasion during this time a float switch failed to function and the wet well was drawn down to the bottom of the suction pipe and held there approximately for three-quarters of an hour. This brought a large quantity of floating grease through the pump and unusual quantities of air. This all was handled, however, without affecting the pumping efficiency thereafter.

Maintenance consists of flushing with clear water using the disconnector fitting shown in Fig. 2. Any sediment that carries over has an opportunity to settle and be flushed out at a lower blow-off valve. Air is automatically vented whenever the pump casing is under pressure, and a vacuum seal at the valve outlet prevents air from being drawn back into the valve or casing during shutdown periods.

With this arrangement in service, maintenance has been reduced to one operation per week resulting in a time saving of approximately 10 hours each week. This is an important consideration at any time, but especially now. It is expected that an analysis of future pump operation will show very definite power savings because of the elimination of those times when the pump goes into operation with the casing largely filled with air, resulting in a useless churning of the pump without producing any sewage flow.

Missouri Valley Section Cancels Meeting

The Missouri Valley Sec., AWWA, joined the list of sections which are cancelling Fall meetings in the interest of war-time transportation, when it announced that its scheduled meeting of Oct. 23-24 in Kansas City will not be held. The Exec. Com. retains the right to call a meeting later in the year if conditions permit and warrant.

F. W. Dodge to Use Blueprint Now Slogan

The F. W. Dodge Corp., publishers of the Dodge Group of Building Publications, is promoting the use of the slogan, "Blueprint for Tomorrow's Needs Now!" in an effort to stimulate the designing of postwar construction projects before the war is over. This is the first instance in which organizations outside the water works and sewerage field have made use of the slogan which was originated by E. L. Filby, the Field Director for the past year of the Committee for Water and Sewage Works Development. The Committee granted permission for use of the slogan and stickers by any one interested in promoting early construction revival, with the proviso that no person or firm buy the sticker for resale at a profit.

Clyde E. Williams Moves Offices to New Location

Clyde E. Williams, Consulting Engineer of South Bend, Ind., has moved his offices to a new location, 312 W. Colfax Ave., in South Bend. Mr. Williams, who was Senior Engineer of the Indiana State Board of Health in 1937-39 and City Engineer of South Bend since that time, has done a number of housing projects and water works improvements since entering the consulting field. Mr. Williams is a member of AWWA, ASCE, and other professional and engineering organizations.

"Tom" Camp Acquires Consulting Practice of Late Sam Ellsworth

Thomas R. Camp, Consulting Engineer, Boston, has announced that on Sept. 15 he acquired the consulting practice of the late Samuel Ellsworth, and henceforth will be located at the offices formerly occupied by Mr. Ellsworth at 6 Beacon St., Boston 8, Mass. Mr. Camp will specialize in water works and water treatment, sewerage and sewage treatment, municipal and industrial wastes, investigations and reports, design and supervision, research and development, and flood control.

WATER AND SEWAGE PATENTS

(OF RECENT ISSUE)

WATER PATENTS

SOFTENING FEED WATER FOR BOILERS. Karl Hermez (vested in Alien Property Custodian). U. S. 2,356,405; Aug. 22. An apparatus for softening water boiler water comprising a quadrilateral tower with baffle plates, etc.

FLOW CONTROLLER. Irving O. Miner (to Builders Iron Foundry, Providence, R. I.). U. S. 2,357,341; Sept. 5. A Venturi shaped controller for maintaining a desired rate of flow under a variable effective head.

PORTABLE WATER STILL. Leo M. Beckwith, Brookline, Mass. U. S. 2,357,869; Sept. 12.

WEIGHTED BOX SEAL FOR SAND CLEANERS. Charles E. Fraser, Kew Gardens, N. Y. U. S. 2,357,945; Sept. 12. A traveling cleaner for a filter bed adapted for movement over the bed, with the device sealing off portions of the surface of the sand, picking up the sand and washing it.

TOBOGGAN SEAL FOR SAND CLEANERS. Nicholas J. Kayser (to Charles E. Fraser). U. S. 2,357,957; Sept. 12. A traveling cleaner for filter beds similar to the above (and others previously reported).

VALVE. John D. Mattimore (to Walworth Patents, Inc., Boston). U. S. 2,357,965; Sept. 12.

WATER SAMPLING DEVICE. Blair H. Stone (to Dearborn Chemical Co., Chicago). U. S. 2,357,981; Sept. 12. A portable boiler water sampling device.

ART OF TREATING WATER FOR INDUSTRIAL CONSUMPTION. Gail J. Fink and Homer H. Richardson (to National Aluminate Corp., Chicago, Ill.). U. S. 2,358,-222; Sept. 12. The process of treating water for industrial consumption by inhibiting the deposition of alkaline earth scale forming compounds by use of a polyphosphoric acid compound in relation to the soap hardness and alkalinity.

Note—The following patents were unfortunately "lost" at the time of make-up for the last issue and are printed at this time to make the series complete.

WATER PATENTS

ELEVATED TANK. James O. Crafton (to Pittsburgh-Des Moines Co.). U. S. 2,349,096. May 16. A design for an elevated water tank.

CENTRIFUGAL PUMP. Hanns Hornschuch (to Ingersoll-Rand Co., New York, N. Y.). U. S. 2,349,731. May 23.

WATER TREATING DEVICE. Marvin R. Olsen, John J. Reid, and Edwin C. Higgins (to Sears, Roebuck & Co., Chicago, Ill.). U. S. 2,349,830. May 30. Device for combination with a sink to hold water treating material for use in the home.

WATER SOFTENER. Edmund A. Kathe (to Rainflo Manufacturing Co., Springfield, O.). U. S. 2,350,-045. May 30. A device for automatic addition of water softening chemicals to a water supply from a hydraulic piston actuated by the water supply when said water is withdrawn from the supply.

FILTERING APPARATUS AND METHOD. Charles E. Fraser. U. S. 2,350,160. May 30. A method of cleaning a downflow filterbed consisting of a machine which travels the surface of the bed isolating sections the surface of which are picked up, agitated and washed.

FLOWMETER. Kermit Fischer (to Fischer & Porter Co., Hatboro, Pa.). U. S. 2,350,343. June 6. A flow measuring device of the rotameter type.

SEWAGE PATENTS

SEWAGE SAMPLER. H. W. Gillard and S. L. Adelson (to Infilco, Inc.). U. S. 2,348,806. May 16. An automatic sampling device with refrigerated storage for sample during collection period.

SEWAGE PURIFICATION AND TREATMENT. August Schreiber (vested in Alien Property Custodian). U. S. 2,348,854. May 16. A biological treatment comprising downward percolation of sewage through solid particles. Percolating media particles are withdrawn from bottom of tank and screened to remove part of the sludge deposited thereon. Withdrawn particles are thereafter returned to surface of the "filter" within the tank, along with fresh sewage while mixing air with the sewage and solid particles.

SYSTEM FOR TREATING SEWAGE. Samuel L. Tolman (to Jeffry Mfg. Co., Columbus, O.). U. S. 2,-349,390. May 23. A sewage treating system including a primary settling tank followed by a mechanically agitated mixer tank, in turn followed by a secondary settling tank with means of removing sludge from secondary tank and returning part of the sludge with aeration to the mixer.

WASTE PICKLE LIQUOR DISPOSAL. Earl C. Carlson and Douglas F. Sharp. U. S. 2,350,095. May 30. A method of neutralizing waste pickle liquor for disposal by adding a basic solution. Said method characterized by feeding separate flows of liquor and neutralizing agent into the suction of a centrifugal pump and depending on the violent agitation to render complete and instantaneous mixing and neutralization without the formation of lumpy precipitates.

CLARIFICATION OF LIQUIDS. John W. Wood (to Acco, Inc., Bloomfield, N. J.). U. S. 2,350,111. May 30. A coagulation process comprising the diffusion of carbon dioxide through the liquid containing the coagulate matter and having a pH not less than that at which $CaCO_3$ can exist in the liquid, followed by addition of a coagulant to reduce the pH an additional 1.0 to produce the desired coagulation.

FILTER. Harold F. Oswald (to Oliver United Filters, Inc., Oakland, Cal.). U. S. 2,352,340. June 27. A rotary drum vacuum filter.

RECLAIMING OF CONSTITUENTS FROM WASTE SOLUTIONS CONTAINING SULPHUR, ETC. Joseph August, Jr. (to Standard Oil Co., Cleveland, O.). U. S. 2,352,594. July 4. A process of treating waste solution of caustic soda containing accumulated sulphur obtained in the treating of hydrocarbon distillates.

TREATMENT OF IMPURE LIQUIDS. George M. Darby (to Dorr Co., Inc., New York, N. Y.). U. S. 2,353,772. July 4. An apparatus for purifying liquids comprising a tank divided into two zones, upper and lower, with reaction and precipitation to take place with stirring in the lower zone and settling, clarification and sludge removal to take place in the upper zone.

WASTE AND GREASE TRAP. Mario Cavicchioli, New York, N. Y.). U. S. 2,353,993. July 18.

WEATHER CYCLES CAUSED BY PLANET X

By HALBERT P. GILLETTE

San Marino, California

EVERY planet, except far-distant, little Pluto, causes a noteworthy weather cycle whose length is that of its orbital period. One singular fact is that the rainfall peak of each of these cycles occurs when the planet is either in longitude 289 or 109 degrees. In the case of the earth this is either July 12 in regions where the annual peak is in the summer, or January 9 where it is in the winter. But the annual peak in daily sunspot numbers is July 12, with a 50-year average of 53 spots, whereas for January 9 the average is 34 spots. Another singular fact is that there tend to be secondary rainfall peaks and valleys causing subcycles whose lengths are 1/6, 1/18 and 1/54 the length of the orbital period of each planet. In the case of the earth these subcycles have lengths of 2 months, 20.3 days and 6.76 days.

Upon finding these planet subcycles it occurred to me that the harmonic cycles of 67, 22 1/3 and 7 4/9 years in the ring thickness of California sequoias ("big-trees") might be subcycles due to a planet whose orbital period is 6x67 or 402 years. I have found good evidence that this is the case. Sequoia rings indicate a rainfall maximum or peak of this 402-year cycle in A.D. 1682. By analogy, it follows that this 402-year planet X was in heliocentric longitude 289 degrees at the rainfall peak in 1682.

In 1909 William H. Pickering (Harvard Annals, vol. 61, pages 113-162) inferred the existence of a planet whose orbital period is about 374 years. He said it perturbed Uranus about every 107 years, causing it to run ahead of its calculated longitude about A.D. 1710, 1816 and 1922, the last named date being one that he published in 1931 (Popular Astronomy, vol. 39 p. 389). Since the orbital period of Uranus is almost exactly 84 years, it is easily deduced that Uranus would be in the same heliocentric longitude (conjunction) with planet X about every 106 years. If planet X was in longitude 289 degrees in 1682, it was in conjunction with Uranus about 1763 and 1869; and in opposition about 1710, 1816 and 1922. When two planets are in conjunction with respect to the sun (heliocentric) their mutual gravitation causes the inner one to move outward, thus losing velocity and longitude. The converse occurs when they are in opposition (180 degrees apart), the inner planet then gaining velocity and longitude. This explains, I believe, why Pickering's three dates of maximum gain in the longitude of Uranus agree so closely with my estimated dates of opposition of Uranus and planet X. That the orbit of X is nearly circular is indicated by the regular spacing of peaks in the tree-ring cycles of 22 1/3 and 67-years, which are harmonic with the 402-year cycle. It is evident that the 22 1/3-year weather cycle is harmonic with the so-called "11-year" sunspot cycle, for alternate peaks of the latter differ too little from peaks of the former to be accidental.

Since X probably was in longitude 289 degrees when it caused the tree-ring peak of 1682, and since its orbit is nearly circular, it is now about heliocentric longitude 164 degrees. It is probably close to the ecliptic, for the orbital planes of all the giant planets are close to that of the earth. The perturbations of Uranus cited by Pickering indicate that their cause is a giant planet. This is confirmed by the amplitudes of the tree-ring cycles caused by X and by the amplitude of the "11-year" sunspot cycle; for while those cycles are probably due to currents of electrons magnetically induced, the mass of magnetic material in a planet probably increases with its mass. Susceptibility of iron to magnetic induction by streams of electrons increases as its temperature decreases; hence it is possible that X has less mass but lower temperature than any other giant planet. The amplitude of the 67-year cycle in tree-rings (due to X) exceeds that of the 27.46-year cycle (due to Neptune) and that of the 14-year cycle (due to Uranus), in spite of the fact that X is nearly three times as far from the sun as Uranus is.

That the amplitude of the 402-year weather cycle is great is shown by series of recessional moraines as well as by series of calcareous rock strata. By mean of varves (annual layers of sediment) I have found that such series often record a cycle of the order of 400 years.

In previous articles I have outlined an electron theory of cycles due to planets, in which streams of electrons are inferred to flow from the sun in heliocentric longitudes that are invariable, the strongest streams being in longitudes 289 and 109 degrees. When a planet crosses one of these streams its magnetic field increases its intensity. Probably there is a return current from the planet to a magnetic pole of the sun. Near the peak of any electron cycle caused in the sun by any planet, there is an increased efflux of solar electrons in low latitudes. This increases the electron charge in the earth and its atmosphere when the earth crosses a stream of solar electrons. Since electrons tend to reflect the photons of radiant waves, less heat reaches the lower atmosphere of the earth at such times. This cooling of the lower atmosphere is conducive to rainfall; so, also, is the presence of more electrons, for they serve as nuclei of condensation. Increased bombardment of the earth by solar electrons increases the magnetism induced in its ferriferous crust and core, thus causing deformation of the earth and movements of its crust; as well as increase in its magnetic field. This explains the frequency of earthquakes near sunspot maxima.

Electrons moving in a magnetic field tend to move spirally, in accordance with the Faraday principle of magnetic rotation of electrical currents. This explains, I believe, the vortex nature of sunspots. Electrons emitted spirally by the sun must have magnetic polarity and, therefore, be attracted by the pole of a planet having opposite polarity.

In a forthcoming 80-page booklet on Cycles and Their Causes, data will be given supporting this electronic theory of cycles. The lengths of cycles and dates of their maxima and minima will be given; also correlations of different kinds of cycles.

A copy of "Cycles and Their Causes," the printing of which is being temporarily delayed because of the paper situation, will be sent on request. Address Gillette Publishing Co., 330 South Wells St., Chicago 6, Illinois.

It's always pleasant to be able to pass along a good idea, and the ingenious way that the engineers in the District of Columbia Sewer Department handle their trash racks may give you a helpful tip, if you have a similar problem.

At the main Sewage Pumping Station, storm water collects in a chamber, from which it is lifted by large impeller pumps. The trash racks which guard the inlet, instead of being the usual bar type, are assembled from wrought iron pipes. These pipes are retained at top and bottom by pins projecting from 4-in. by 4-in. angles. This eliminates any necessity for welding or other fastening and if at any time any repairs are necessary because of mechanical or other damage, removal of any individual member is easy.

Regardless of what kind of screen you use, of course, you'll find wrought iron is a first-class material to withstand the severe service conditions encountered. Examples of its durability can be found in all sections of the country. In one Michigan installation, it is installed in interceptor bars in a large storm sewer. In a Missouri installation, it is used to separate indigestible solids from the sewage before it enters the Imhoff tanks. Other installations in the past few years have been reported from Massachusetts, Colorado, New York, Ohio, Illinois, Maryland, and Iowa.

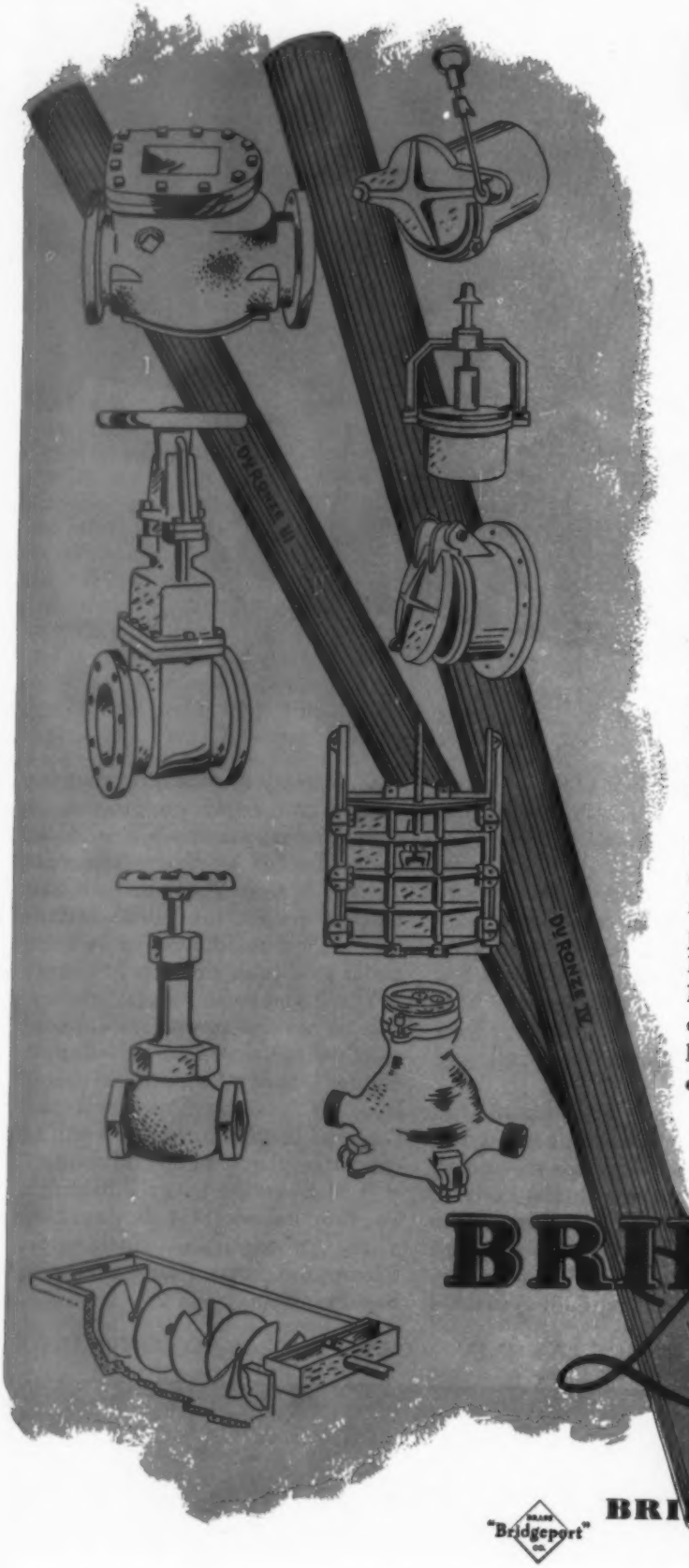
The durability of wrought iron is the direct result of its structure. Tiny fibers of glass-like silica slag are threaded through the body of high-purity iron. These fibers make up only about 3% of the material by weight, but they play a very important part in extending service life. Instead of corrosion causing pitting and rapid penetration as with ordinary materials, it is halted and deflected by the microscopic threads of slag. These threads also help to anchor the initial surface film, which shields the underlying metal as a scab protects a wound.

You'll find some helpful information on several screen installations —as well as dozens of other applications—in our bulletin, "Wrought Iron for Sewage Treatment and Disposal Installations." We will be glad to send you a copy on request.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Chicago, St. Louis, Houston, Seattle, San Francisco.

CORROSION COSTS YOU MORE THAN WROUGHT IRON

Product improvement through



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To fight corrosion in Water Works and Waste Disposal

Corrosion attack of equipment used in sewage and industrial waste disposal is a major obstacle to uninterrupted service and low maintenance costs. Bridgeport's DURONZE III and DURONZE IV alloys provide maximum service life and minimum replacement costs for such equipment under even the severest corrosive conditions.

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Illustrated are suggested applications for Bridgeport's DURONZE III and IV alloys. Users or manufacturers of sewage or water works equipment who wish to solve important corrosion problems are invited to test DURONZE in service. By merely substituting a corrosion resisting DURONZE alloy for a vulnerable part made from ordinary materials you may increase the useful life of your equipment without changing its design. Please write...today...for Bridgeport's 80-page DURONZE Manual, or communicate with our Technical Advisors about your corrosion problems.

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MEETINGS SCHEDULED:

Oct. 12-14—PITTSBURGH, PA. (Hotel William Penn).
Federation of Sewage Works Associations, Exec. Sec'y, W. H. Wisely, Illinois Building, Champaign, Ill.
and
Penna. Sewage Works Association. Sec'y-Treas., Bernard S. Bush, Kirby Health Center, Wilkes-Barre, Pa. (Joint Meeting with Fed. Sew. Wks. Assns.)

Oct. 17-19—AUSTIN, TEXAS (Hotels Austin & Driskill).
Southwest Section A.W.W.A. Sec'y-Treas., George J. Rohan, P. O. Dr. 449, Waco, Texas.

Oct. 24-26—LOS ANGELES, CALIF. (Biltmore Hotel).
California Section A.W.W.A. Secretary, Blair I. Burnson, P.O. Box 720, Oakland 4, Calif.

Oct. 26-27—PARKERSBURG, W. VA. (Chancellor Hotel).
West Virginia Section A.W.W.A. Secretary, J. H. Harrington, Director, Div. of Sanitary Engineering, State Dept. of Health, Charleston 5, W. Va.

Oct. 30-31—PITTSBURGH, PA. (Hotel William Penn).
Engineers' Society of Western Pennsylvania. (Fifth Annual Water Conference). General Chairman, H. M. Olson, Hotel William Penn, Pittsburgh, Pa.

Oct. 30-31—COLUMBIA, MO. (Tiger Hotel)
Missouri Water and Sewerage Conference. Sec'y-Treas., Warren A. Kramer, State Board of Health, State Office Building, Jefferson City, Mo.

Nov. 2-3—TORONTO, ONT., CAN. (Royal York Hotel).
Canadian Institute on Sewage and Sanitation. Secretary, Dr. A. E. Berry, Parliament Bldgs., Toronto, Ont., Can.

Nov. 2-4—ATLANTIC CITY, N. Y. (Hotel Madison).
New Jersey Section A.W.W.A. Sec'y, C. B. Tygert, Dist. Mgr., Wallace & Tiernan, Inc., Box 178, Newark, N. J.
(Joint Meeting with)

Nov. 2-4—
South Jersey Association of Water Superintendents. Secretary, Walter Spencer, Merchantville, N. J.

Nov. 8-10 — PHILADELPHIA, PA. (Benjamin Franklin Hotel).
Four States Section A.W.W.A. Sec'y-Treas., H. Lloyd Nelson, U. S. Pipe & Foundry Co., Broad and Chestnut Sts., Philadelphia, Pa.
and
Penna. Water Works Operators' Assn. Sec'y-Treas., I. M. Glace, 22 South 22nd St., Harrisburg, Pa. (Second Joint Wartime Conference.)

Nov. 14-15—RICHMOND, VA. (John Marshall Hotel).
Virginia Section A.W.W.A. Secretary, W. H. Shewbridge, 119 State Office Bldg., Richmond, Va.

Nov. 14-15—WATERTOWN, S. D. (Lincoln Hotel).
South Dakota Water & Sewage Works Conference. Sec'y-Treas., Glen J. Hopkins, State Board of Health, Pierre, S. D.
(This meeting, previously listed for Sept. 19-20 has been postponed to above date.)

Nov. 16-18—ST. PETERSBURG, FLA. (Swannee Hotel).
Florida Section A.W.W.A. Sec'y-Treas., Prof. A. P. Black, University of Florida, Gainesville, Fla.

Jan. 17-1945—NEW YORK, N. Y. (Pennsylvania Hotel)
New York Section A.W.W.A. Mid-Winter Luncheon Meeting. Secretary, R. K. Blanchard, 50 West 50th Street, New York, N. Y.

Sections Not Holding Fall Meetings
Kentucky-Tennessee Section A.W.W.A.
*Missouri Valley Section A.W.W.A.
New York Section A.W.W.A.
North Carolina Section A.W.W.A.
Pennsylvania Water Works Association.
*Western Pennsylvania Section A.W.W.A.
Wisconsin Section A.W.W.A.

*Previously listed but cancelled.

The skill that makes sea water drinkable for him . . .

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LATEST example of Permutit's service to our country at war is the kit which takes the salt out of sea water to keep alive our flyers forced down at sea. After the war Permutit's long experience in water treatment will help to build a happier, healthier America. For instance, recent developments by Permutit* make it more practical and economical than ever for municipalities to enjoy good water supplies free of hardness, dirt and iron.

Many cities have put good water at the top of their lists of post-war improvements. Plan it now for *your* community! Write for full details to The Permutit Company, Dept. G1, 330 West 42nd St., New York 18, N. Y. In Canada: Permutit Company of Canada, Ltd., Montreal.

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PERMUTIT

WATER CONDITIONING HEADQUARTERS

FORGING AHEAD IN BUSINESS

BACK in 1772, a precocious twelve year old boy named Alexander Hamilton wrote to a friend..."I contemn the groveling condition of a clerk or the like, to which my fortune condemns me, and would willingly risk my life, though not my character, to exalt my station . . . I mean to prepare the way for futurity."

This young man had a mind that could see the root of things and look into the future. At the age of fourteen he was managing his employer's business in the latter's absence for his health. The boy was doing a man's job, but such success did not satisfy his ambitions. His eyes were turned toward the American colonies. *He knew that a man could go farther in times of change than when times are static.*

Hamilton fought through the Revolution and distinguished himself. Later, when most men were blinded to the real problems by talk of freedom, he saw that the Constitution had been designed to overcome economic difficulties; he realized that the men who controlled the finances of the country would play a major role in its destiny.

As the first Secretary of the Treasury of the United States, Hamilton provided a sound currency for America, established its credit and laid down the principles that have guided us ever since. Based on the foundation laid by this brilliant young man who was willing to learn from books and other people, the United States became a power in Finance, in Industry, in Commerce and in Agriculture.

We are living in times of tremendous change today. Every man genuinely interested in self-improvement will want to know about the Institute which so appropriately bears Alexander Hamilton's name, and the training it offers in the fundamentals of business and industry. The whole story is told in the fast-reading pages of "FORGING AHEAD IN BUSINESS." Write the Institute, giving your name and address, and your FREE copy of this famous book will be mailed promptly.

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Here and There with Doc Symons

HERE is the last "third" (and a couple we left out) of that list of house organs we began telling you about in August. If we've missed any, let us know.

The Power Specialist—
Johns-Manville Co., New York 16, N. Y.
The Rambler—
Automatic Control Co., St. Paul, Minn.
The Rex World—
Chain Belt Co., Milwaukee, Wisc.
The Valve World—
Crane Co., Chicago, Ill.
The Water Tower—
Chicago Bridge & Iron Co., Chicago, Ill.
The Yeomans Guard—
Yeomans Bros. Pump Co., Chicago, Ill.
U. S. Piper—
U. S. Pipe and Foundry Co., Burlington, N. J.
Water—
American Water Works & Elect. Co., New York, N. Y.
Water—
Pittsburgh Equitable Meter Co., Pittsburgh, Pa.
Water Lines—
Indianapolis Water Co., Indianapolis, Ind.
Wheelco Comments—
Wheelco Instrument Co., Chicago, Ill.
Worthington News (Harrison Works)—
Worthington Pump & Mach. Corp., Harrison, N. J.
Electromet Review—
Electro-Metallurgical Co., New York, N. Y.
Paint Progress—
New Jersey Zinc Co., New York, N. Y.

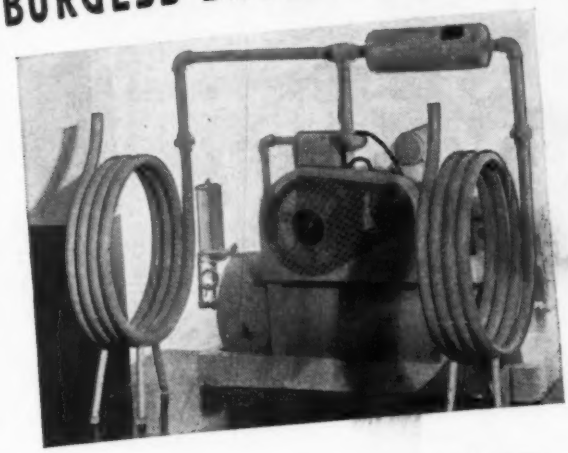
* * *

Echoes of the AWWA Convention: We thought the AWWA Milwaukee was over last June. Not so - - - there are still repercussions. In particular, one Harry Krum, Water Fixer of Allentown, Pa., is still upset over his railroad sleeping accommodations.

This is evident from a series of letters in which Harry, being from the hinterland, complains bitterly that he was taken in by that "city slicker Sigworth" when the latter procured for him a roomette reservation to Milwaukee.

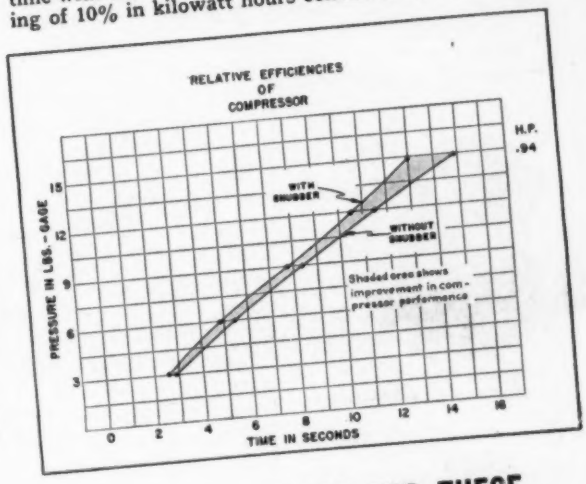
Mr. Krum, believing that "roomette" is the past tense of "roomeat," expected to find both bed and board in his accommodations. Actually he was able to find neither, and he, being both scientist and amateur detective, spent all night in trying to find one or both. At last writing, he was placing his complaint in the hands of his attorneys, Kritzel, Witzel and Fritzel. Sigworth,

BURGESS SNUBBER BULLETIN for Diesel Exhaust Noise Control



A Burgess Air Intake Snubber installed near a "starved" compressor will smooth out the airflow through the intake pipe and restore intake conditions to normal. This fact has been demonstrated by tests on a compressor using two identical pipe lengths that would starve the compressor. One intake had no Burgess Snubber; the other was Snubber-equipped. The compressor was operated with the un-snubbed intake and the time to attain a specific tank pressure was noted with a stop watch. The test was repeated, using the snubbed intake system, and the time again noted. The results are shown on the chart in which the shaded area reveals the improvement in compressor performance when a Burgess Air Intake-Snubber is used on a starved compressor.

The wattage drawn from the power line by the motor was the same for each test, but the shorter operating time with the Snubber-equipped air intake made a saving of 10% in kilowatt hours consumed by the motor.



STARTLING PERFORMANCE — INTAKE SNUBBER STEPS UP COMPRESSOR EFFICIENCY

The power required to operate a compressor is roughly proportional to the air delivered. This condition may change if the pipe on the intake is of such length that it causes "supercharging" and overloads the motor.

On the other hand the intake pipe may reduce the volumetric efficiency of the compressor by 10% or more without an equivalent reduction in horsepower. This condition occurs when the air column in the intake pipe oscillates in opposition to the compressor piston. In either case, intake noise is increased.

SIX GAS BURNING ENGINES—NO EXHAUST NOISE

One of the really fine midwestern sewage disposal plants and electric power generating stations is located at Rock Island, Illinois. The project was completed in 1940 at an estimated cost of $3,000,000.

Even though Rock Island is on a main waterway where coal can be transported and unloaded at minimum cost, gas power was chosen for pumping sewage and generating electricity.

Six Climax engines furnish power for the pumps and generators. Uninterrupted service is assured because the Climax engines operate equally as well on sewage gas, natural gas, manufactured gas, or gasoline. Several large standby tanks of gasoline can be pressed into immediate service in emergencies.

Due to the proximity of residential buildings, quiet operation was demanded of this municipal plant. Regardless of the kind of fuel used the exhausts at the Rock Island plant are quiet and smooth-flowing, because the engines are equipped with Burgess Exhaust Snubbers. These snubbers are giving trouble-free silencing and are satisfying every requirement of the operating engineers.

LOOK FOR THESE BURGESS SNUBBER CONSTRUCTION FEATURES

1. Dished head eliminates excessive weight yet reduces "drumming" effect otherwise caused by successive pounding of gas slugs.
2. Shells double wrapped throughout (laminated) to give added strength and to reduce excessive vibration or shell noise.
3. Welded throughout for greater strength and longer life.
4. Internally designed to give proper silencing to engine air intake and exhaust, without impairing the engine efficiency.

Published by **BURGESS-MANNING COMPANY** Chicago, Illinois

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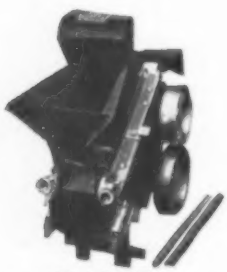
SLUDGE DISPOSAL— YESTERDAY and TODAY

Royer S "Jr."
(Electric motor driven).

Royer S "Jr." G
(Gasoline engine driven).



Model "SK"
(Belt to tractor driven).

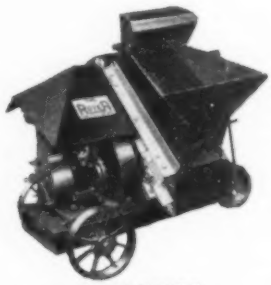
Model "NSC-4"
(Electric motor driven).

When, a decade ago, the first Royer Sewage Sludge Disintegrators were put in service, the disposal of sludge had been strictly a matter of expense—the cost of burning, burial or hauling away. Sewage works superintendents have since learned that this expense can be transformed into a profit; that with the Royer their sludge can be converted into an effective, ready-to-use fertilizer with a minimum amount of labor. Although the fertilizing values in sewage sludge had long been known, it took the Royer to deliver them in usable form. Sludge cake as it comes from the drying beds is too coarse for practical use.

Through the years Royer users have found a ready market at a worthwhile profit for their fertilizer. Seasonal surpluses have been advantageously used in city parts, cemeteries and golf courses. It is small wonder that the number of Royers in service has grown to its present impressive total.

The wartime demand for greater food crops, plus the shortage of manpower and mechanical fertilizing materials, has enhanced the market for Royer-prepared fertilizer—among commercial growers and Victory gardeners alike. Many municipal sewage plants and park boards have worked out joint ownership and other cooperative arrangements.

Twelve Royer models are available. Send for a copy of comprehensive "Sewage Sludge Utilization Datalog."



Model "NSO"
(Gasoline engine driven).

THE ROYER FOUNDRY & MACHINE CO.
170 PRINGLE ST., KINGSTON, PA.

PIONEERS IN THE SALVAGE OF SEWAGE SLUDGE

for his part, has offered to settle for something more than 13 cents.

P.S.—For some reason copies of all correspondence were sent to a "noted consulting engineer" in Harrisburg, but for the life of us we can't remember his name.

* * *

Well, what do y' know! At the recent annual meeting of the Amer. Chem. Soc. we learned, among other things, that Dr. Willem Rudolfs, Dir. of Research, N. J., Agr. Expt. Sta., believes the only persons we write about are former members of the Ill. State Water Survey (there were four of them at the Water and Sew. Div. dinner), but, honestly, we do know some one else. For example, Earnest Boyce, lately a Comdr. in the USPHS, is now Prof. of San. Engr. at the Univ. of Mich. - - - and Dr. R. S. Ingols, a protege of Dr. R., and lately a citrus waste expert, is an instructor in San. Engr. in the Pub. Health School at the Univ. of Mich. - - - G. E. Terhoeven, one of our boys at Buffalo and later industrial waste analyst for National Aniline, is now in the uniform of the USPHS and running a trailer lab. on industrial wastes in the Ohio River Valley - - - Gerald Roelich, L. H. Kessler's asst. in the R. & U. Div. (etc.), is leaving San. Engineering and going to work for the Elastic Stop Nut Corp. - - - "Stu" Coburn, of Metcalf and Eddy, is back from seven months "on the beach at Waikiki" - - - R. S. (Bob) Phillips has moved again but was last heard of still in Fla. - - - "Bill" Stanley is a full Prof. at M. I. T. with a reorganized and enlarged San. Engr. Dept. - - - Tom Camp has taken over the consulting practice and office of the late Sam Ellsworth - - - Dr. Vincent and John Synan of Mathieson Alk say that Chlorine Dioxide is great for removing chlor-phenol tastes but don't say that it is a cure-all yet - - - If you want a small aeration tank (with swing diffuser) for experimental purposes, write the Treasury Dept. at Washington for a "desoaper" - - - Dr. Don Tarvin, one-time staff member of (Oops, excuse us, Dr. R.) and lately of Gen. Chemical Co., is now in Research and Development at Calco Chemical Co.

* * *

The Northwestern Conference on Sewage Treatment has gone on record as favoring the renewal of licensing of sewage operators in Ohio and the inauguration of operators' schools. Second the motion.

* * *

In the Sept. issue of *W. W. & S.*, the lead article by "Mike" Loving

THE WINNAH!

in the battle of Sludge Conditioning and Coagulation of Sewage and Industrial Wastes

•

You're putting your money on the Champ when your choice is ISCO

Ferri-Clor
FERRIC CHLORIDE

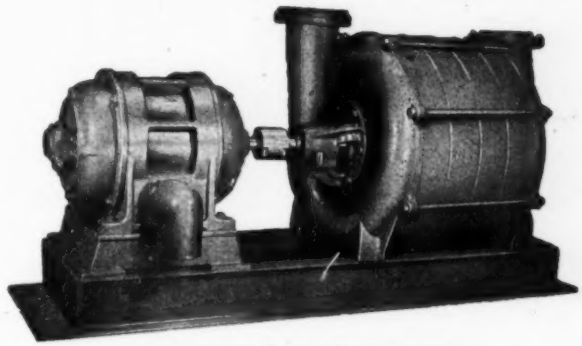
Write for booklet describing its uses and advantages.

INNIS, SPEIDEN & COMPANY
Established 1816
117 Liberty Street . . . . . NEW YORK
CHICAGO • CLEVELAND • CINCINNATI
BOSTON • PHILADELPHIA • GLOVERSVILLE, N. Y.

CUT COSTS in Sewage Treatment

SELECTION of the blower best suited to your plant conditions can prove a definite economy measure—especially desirable under today's conditions. Allen Billmyre helps your selection by providing *both* of the two basic types of blower.

BILLMYRE CENTRIFUGAL BLOWERS
Maintain Constant Pressure



Turbo centrifugal type blower

Variations in volume demand do not affect a Billmyre Turbo Blower's delivery of constant, unfluctuating pressure. Utmost simplicity in design and construction. No elaborate controls. No wearing parts. No need of internal lubrication. Built for long service.

POTTSTOWN ROTARY BLOWERS
Maintain Constant Volume

Pressure fluctuations do not cause variation of the volume of air delivered by these positive displacement rotary blowers. Close, accurate clearance between impellers and casing maintains high volumetric efficiency. No reciprocating or sliding parts —internal lubrication unnecessary. Extra rugged construction.

FREE DESCRIPTIVE BULLETINS—Get detailed information. Write today.

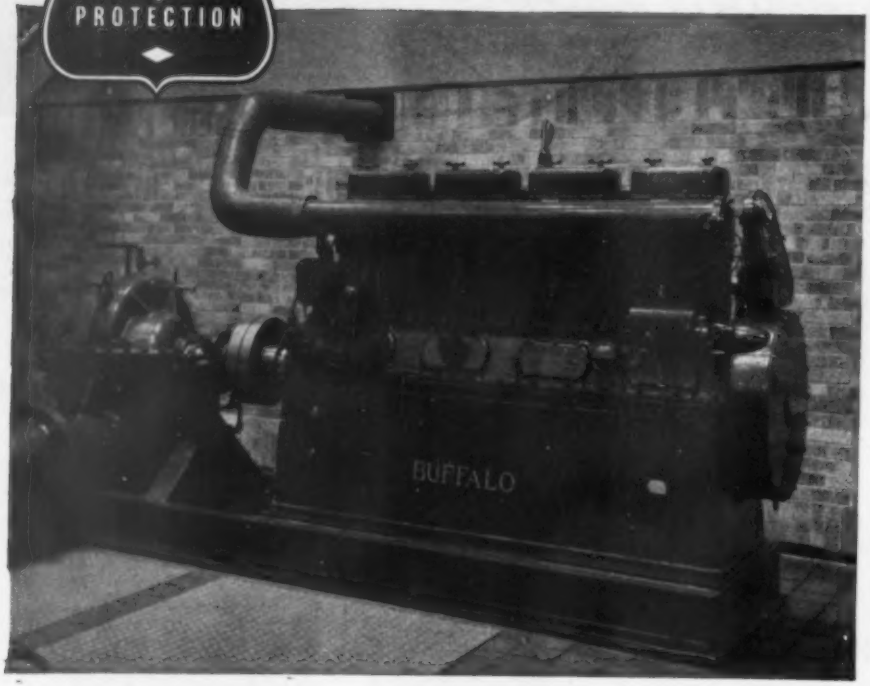
Allen Billmyre Co., 449 Fayette Ave., Mamaroneck, N. Y.

ALLEN BILLMYRE
BLOWERS AND EXHAUSTERS

BUFFALO MOTORS

ASSURANCE of PROTECTION

Water Works Installation—City of Saskatoon, Sask. Buffalo Model RAB-8 Engine, 8 cylinders, 6½" bore, 7" stroke, developing 350 BHP at 1500 RPM, driving a Worthington Pump.



TRUSTWORTHY H. P.

THE Name BUFFALO on your stand-by motors in generator or pumping units is assurance of complete protection against a power emergency.

Specializing in this heavy-duty equipment for many years, this Company knows how to build dependable motors fitted to the engineering of their installation.

BUFFALO motor specifications give the proof. Studying them, the engineer will realize that Buffalo builds the right motor for this duty. To meet the needs of any service there is the choice of manual, remote control, or full automatic starting.

Engineers and others interested are invited to write for specification sheets for their files, and if an individual application is proposed, please feel free to consult the men of our staff who have been building and installing BUFFALO Motors for a generation. Remember, trustworthy stand-by equipment pays for itself two ways—in insurance cost savings and in assurance of protection.

BUFFALO GASOLENE MOTOR COMPANY

DEPT. WW-104 BUFFALO 13, N. Y., U. S. A.

BUFFALO MOTORS

ASSURANCE of PROTECTION

BUFFALO ENGINES — 100 H. P. THROUGH 750 H. P. — IN GENERATOR AND PUMPING SETS FOR WATER WORKS — AIRPORTS — COMMUNICATIONS — FLOOD CONTROL — HOSPITALS — INSTITUTIONS — MINES — MOVABLE BRIDGES — THEATRES — SEWAGE PLANTS.

of the Amer. Concrete Pipe Assn. told of the benefits of modern sewerage systems, but he omitted the "prize" benefit as found at Buffalo, N. Y. After the sewage treatment works started operation, only a few weeks were required for the Niagara River to return more or less to its pristine clarity. The decrease in turbidity made it possible to see, in some ten feet of water off Grand Island, a number of amber colored bottles. Although the labels had washed away long since a frightened rum-runner had dumped his load when the Govt. cutter came too close, there was an unmistakable flavor of old Scotland in the bottles when they were retrieved. - - - Dividends from Sewage Treatment?

* * *

With a bit of Nostalgia we read the Sept. issue of the *U. S. Piper* containing an article on "Danville Installs 21,000 ft. of C.I. Main . . ." for pictured there was the office building of the plant where we broke into the "water game." After a few years' apprenticeship in the filter room, it was in that building where Gene Clark of the Ill. State Dept. of Health first taught us how to streak an E.M.B. plate nearly a quarter of a century ago.

* * *

Rod Reed, Jr., of the McCarty Adv. Agency in Pittsburgh, is the fellow who edits the house organs of the Pittsburgh-Equitable Meter Co. Rod is also responsible for the beautiful advertising inserts that appear regularly in *W. W. & S.* No doubt he was responsible for that snappy slogan, "Good Management Begins with Good Measurement." - - - We wonder if he was also responsible for the statement in the lower left-hand corner, which said, in effect, that ten to twelve feet of snow is equivalent to an inch of rainfall. - - - Did you ever melt ten *feet* of snow, Rod?

* * *

Are you surprised to learn (as we were) that next to treatment (53 per cent) and operation (48 per cent), plant design is third (45 per cent) in the interests of the readers of *W. W. & S.*? Corrosion control is fourth, with protective paints and taste and odor control tied for fifth place. We learned this from a sampling of readers in 39 states and six foreign countries. Readers have an average of some seven interests out of forty-two different ones expressed. We are not interpreting this to mean that readers want (for example) 45 per cent of the reading matter devoted to plant design, etc. But it does give us some good ideas

Important Announcement

Omega Machine Co., a Division of Builders Iron Foundry, announces the removal of its factory and offices to 9 Codding St., Providence, R. I., from Kansas City, Mo.

OMEGA

"THE LAST WORD IN CHEMICAL FEEDERS"

Improved plant and manufacturing facilities permit early deliveries of

Universal Dry Feeders
and
Precision Solution Feeders

OMEGA MACHINE COMPANY
A Division of Builders Iron Foundry
9 Codding St., Providence, Rhode Island
122 S. Michigan Ave., Chicago, Illinois

We Are Doing Our BEST for UNCLE SAM

We'll Do the Same for YOU

Our business is building pumps. Our ONLY policy is to build fine pumps. When you install pumps "by Aurora," you know that lasting efficiency and dependability are at work on your important liquids handling jobs.

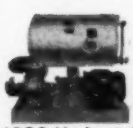
Aurora Deep Well Turbines for all conditions—4" to 24"

Type AD Hor. Split Case, Two Stage Centrifugal

NSA Aurora Centrifugal Sump Pump

Type OD Hor. Split-Case Double Suction Single Stage Centrifugal

APCO TURBINE-TYPE PUMPS—the simplest of all pumps. Ideal for small capacity, high head duties. Silent, compact and lasting.



APCO Horizontal Condensation Return Unit

Type GMC Close-Coupled Centrifugal

Type GGU Side Suction Single Stage Centrifugal

APCO Single Stage Turbine-Type

Write for CONDENSED CATALOG or SEE OUR CATALOG IN SWEET'S

DISTRIBUTORS IN PRINCIPAL CITIES

AURORA Always PUMPS

AURORA PUMP COMPANY

68 Loucks Street, AURORA, ILLINOIS

HOOKER CHEMICALS

ARMY E NAVY

Health by the ton for Your Town

EVERY time a shipment of Hooker Liquid Chlorine comes into a town, you can be pretty sure that community is guarding its health and is keeping its citizens free from diseases caused by water-borne bacteria.

The shifts in population due to war plant expansions and establishment of new war industries in what were formerly unpopulated areas have increased the demands for liquid chlorine for water works, filtration plants and sewerage systems. This demand, on top of the government's greatly enlarged requirements, has taxed our capacity to the utmost.

Even with the speed-up and increase in our output, our standards of production control have been rigidly maintained. Water works officials find each shipment of Hooker Chlorine is of the same uniform high quality as the previous one—the quality that enables them to save time and labor—the quality that makes their jobs easier.

Hooker's Technical Staff, too, is maintaining its record of helpfulness to the men in the waterworks and sewerage field. Their knowledge of chlorine and the other Hooker chemicals is being augmented continually. It is available to you in helping to solve any problems involving their use.

HOOKER ELECTROCHEMICAL COMPANY

Buffalo Ave. and Ward St.
NIAGARA FALLS, NEW YORK

NEW YORK, N. Y. • WILMINGTON, CALIF. • TACOMA, WASH.

CAUSTIC SODA
CHLORINE
BLEACHING POWDER
FERRIC CHLORIDE

Keep the Home Folks Happy With Good-Tasting Water

When Hydrodarco, the activated carbon, is the purifying agent, you have a public relations agent working perpetually for you. Hydrodarco's adsorptive action removes odors and tastes as well as impurities. Properly used, you can always bank on the results it gives.

HYDRODARCO
REG. U. S. PAT. OFF.

DARCO CORPORATION

60 East 42nd Street, New York 17, N. Y.

HYDRODARCO: Reg. U. S. Pat. Off.

DISTRIBUTING POINTS: New York • Buffalo • Cincinnati • Chicago
St. Louis • Kansas City • San Francisco
Los Angeles • Marshall, Texas

as to what you like to read - - - (besides "Here and There," of course).

* * *

Mangling the English language has long been a popular form of entertainment and amusement. Long before such modern masters as radio's Jane Ace and the redoubtable Archie of Duffy's Tavern, Mrs. Malaprop in Sheridan's play, "The Rivals," was an expert at it. Sanitary engineering has its manglers, too, mostly inadvertently but none the less amusing. Take the example (thanks to A. E. Griffin) of the man who determines the "alkalink and resiliency" of the water. - - - We have others in our collection for future issues, - - - have you?

MANUFACTURERS' and EQUIPMENT News

Northrop & Co. Reorganizes

Now Offering New Joint Compound—"BOND-O"

Northrop & Company, Inc., of 50 Church Street, New York City, dealers in Water Works Specialties and Supplies, announces the purchase of

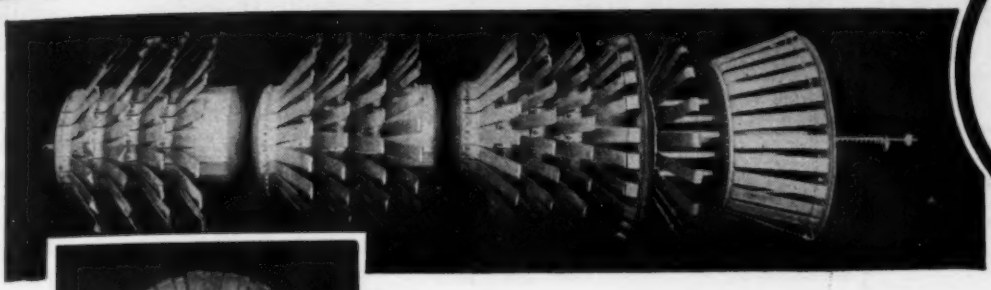
Guy C. Northrop
President

a plant at Spring Valley, N. Y., and is offering BOND-O, a sulphur base jointing compound for cast iron water mains. The following water works men, who represent more than 110 years experience in the water works field, 50 of which have been in the joint compound industry, are associated with this company:

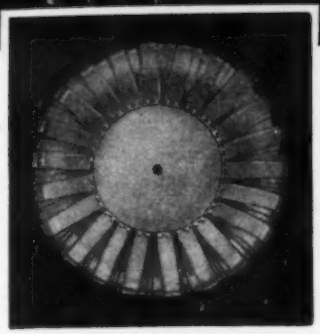
Guy C. Northrop, President of

FLEXIBLE PIPE CLEANING TOOLS

1945 Models



30-in. Scraper 1945 Model



Front View of 30-in. Scraper

FLEXIBLE'S 1945 pipe-cleaning tools are now ready for use. They're better, more effective and faster than ever before.

When FLEXIBLE entered the pipe-cleaning field 11 years ago, we honestly believed our tools were superior to any produced up to that time. We still think so, because we have kept right on making them better. Year by year, job by job, we learn ways to improve, and we intend never to stop.

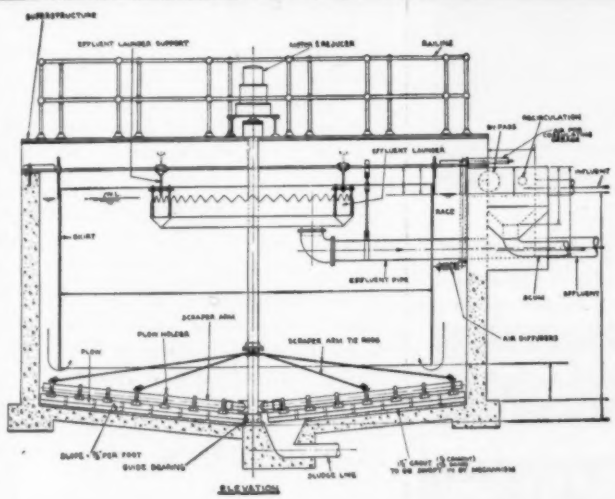
That's one big reason why FLEXIBLE pipe-cleaning jobs are better, faster and more economical. Make us prove our claims on your pipe-cleaning problems. No job too small or too large.

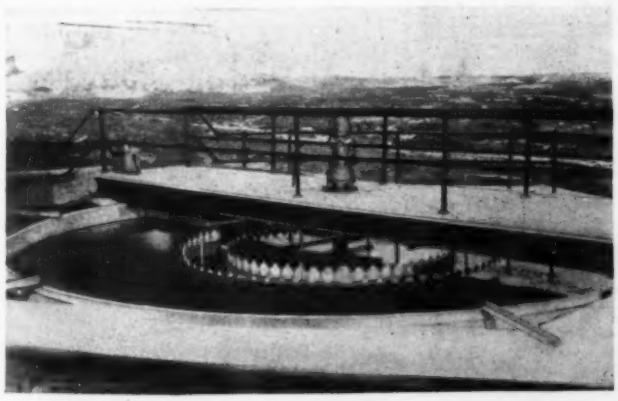
615 Pickwick Bldg.
Kansas City 6, Mo.
1624 Harmon Place
Minneapolis 3, Minn.
P. O. Box 694
Gulfport, Miss.
41 Greenway St.
Hamden, Conn.

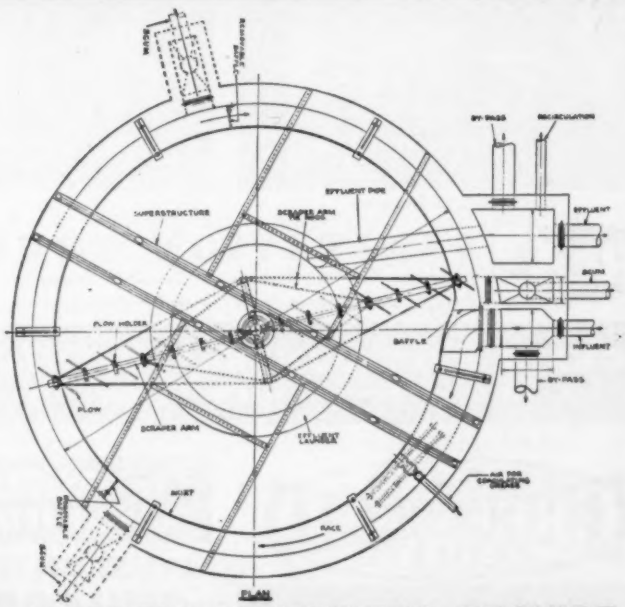
FLEXIBLE UNDERGROUND PIPE-CLEANING CO.

9059 Venice Boulevard Los Angeles 34, California

401 Broadway
New York 13, N.Y.
2645 E. 75th St.
Chicago 49, Ill.
P. O. Box 694
Pittsburgh, Pa.
P. O. Box 165
Atlanta, Georgia







SPIRAFLO CLARIFIERS PROVIDE

1. Excellent removal of scum, oil and grease.
2. Actual detentions are very good.
3. Removal of B.O.D. and suspended solids are above the average.

Write for Bulletin 120

LAKESIDE ENGINEERING CORPORATION
222 West Adams St. CHICAGO

He provides the right answer to your sewage treatment problems

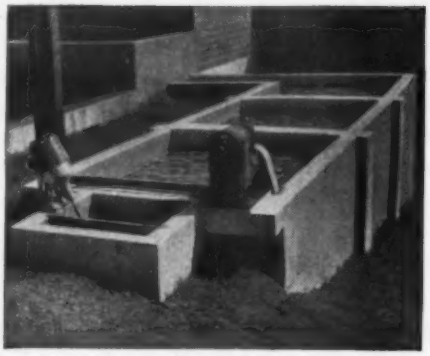
No matter what your sewage treatment problem involves—small plant or large—individual equipment or a complete unit—Rex Sanitation Engineering—Rex S.E.—provides the *right* answer. The preference for his services by leading consulting engineers . . . the exceptional records his installations have achieved are definite evidence of his ability to serve you.

Sludge Collector

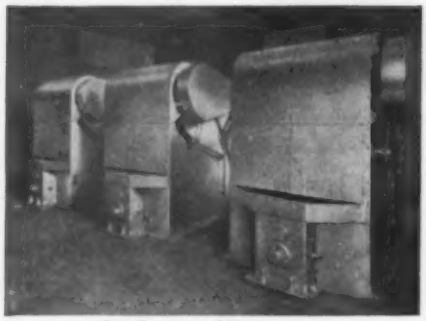
Rex S.E. and his staff of field-trained experts can make improvements in an existing plant or can aid in designing a new one. His Bar Screens and Triturators, Sludge Collectors, Grit Collectors, Aero-Filters, Slo-Mixers and other equipment can help you achieve a new high in efficiency.

Let Rex S.E. shoulder the burden of your planning. Write Chain Belt Company, 1610 West Bruce Street, Milwaukee 4, Wisconsin.

Blueprint Now!



Slo-Mixer



Bar Screen and Triturator

Aero-Filter

REX

SANITATION EQUIPMENT

Triturators • Bar Screens • Tow-Bro Sludge Removers • Slo-Mixers
Aero-Filters • Rapid Mixers • Grit and Sludge Collectors and Grit Washers

CHAIN BELT COMPANY OF MILWAUKEE

Member of the Water and Sewage Works Manufacturers Association, Inc.

ZECO GREENSAND ZEOLITE

ZECO and HI-ZECO Greensand Zeolite for water softening, filtration and iron removal. ZECO Manganese Zeolite for iron and manganese removal. COREXITE mineral for corrosion control and water stabilization.

ZEOLITE CHEMICAL CO.

Sales Office 141 Cedar St. New York, N. Y. Factory Medford, N. J.

Pioneer Producer of GREENSAND ZEOLITE MINERAL

. . for ACCURACY and TROUBLE-FREE OPERATION

INSIST ON THE **WILSON** PULSAFEEDER

Engineered and Manufactured by

WILSON

CHEMICAL FEEDERS, INC.

203 CLINTON STREET AD 33-1 BUFFALO 4, N. Y.

Northrop & Co., entered the water works business in January 1919, selling water meters for eight years. In 1927 he entered the employ of Hydraulic Development Corporation to promote the sale of Hydro-Tite. For the last 16 years he acted as General Sales Manager. Mr. Northrop is a past president of the Water Works Manufacturers Association and represented this group as Director of the American Water Works Association in 1936 and 1937. Mr. Northrop recently resigned his position with Hydraulic Development Corporation to devote his entire time to Northrop & Co. In addition to the manufacture and sale of BOND-O, Northrop & Co. will continue its line of Water Works Specialties and Supplies.

Ralph L. Kelly has recently resigned his position with Hydraulic Development Corp. and will represent Northrop & Co. in selling BOND-O joint compound. Mr. Kelly has been long associated in the water works field and will travel his old territory of Pennsylvania and Virginia. He will also devote part of his time to the New England States.

Bert Seeholzer, Jr., has resigned his position with Hydraulic Development Corp. to devote his entire time to the activities of Northrop & Co. Mr. Seeholzer left the employ of Federal Water Service Corp. in 1928 and since then has sold Hydro-Tite in New York State and New Jersey.

Vic Sohle of Dallas, Texas, who represents R. D. Wood Co. of Philadelphia, will also represent Northrop & Co. in the sale of BOND-O in the Southwestern States. Mr. Sohle has been in the water works business for more than 25 years and is one of the stalwarts of the Southwest. He is making arrangements to stock BOND-O in Dallas for quicker distribution and better service.

Ben F. Crabbe of Birmingham, Alabama, accepted a franchise for the sale of BOND-O for Northrop & Co. throughout the Southeastern States. Mr. Crabbe has been in the water works business for many years and until he entered business for himself about a year ago acted as Southern Sales Manager for McWane Pipe Co.

E. Harold Johnson of Orlando, Florida, who handles a line of water works materials throughout Florida, will represent Northrop & Co. in the sale and distribution of BOND-O.

Omega Machine Moves to Providence

Omega Machine Co., a division of Builders Iron Foundry, has announced the removal of its factory and offices to 9 Codding St., Providence, R. I., from 3409 E. 18th St., Kansas City, Mo. The move became effective on Sept. 1, at which time L. E. Harper, Pres. of Omega, and a director of Builders Iron Foundry, moved his headquarters to the Chicago office, located in the Peoples Gas Building, 122 S. Michigan Blvd. Omega's Sales Manager, R. J. Leveque, and Gen. Mgr. Ralph Baker will be located in Providence.

The Omega Machine Co. was established in 1928 by E. E. Harper and, since that time, has developed a complete line of volumetric and gravimetric dry feeders, lime slakers and related accessories. The consolidation with other divisions of Builders Iron Foundry and the move to Providence brings added manufacturing facilities to Omega and brings together under one roof the three organizations, Builders-Providence, Omega, and %Proportioners%, each a specialist in its own field.

"Reg" Hayes

Made General Sales Manager for "Hydrotite"

Hydraulic Development Corporation, producers of "Hydrotite" pipe jointing compound, announces the promotion of Reginald F. Hayes of

"Reg" Hayes

Boston to the position of General Sales Manager of the company. The appointment becomes effective October 1st.

"Reg." Hayes, popular New England "Ambassador of Commerce," has had charge of "Hydrotite" sales in New England territory since 1936. He has been with the company since 1928.

After Oct. 1st Mr. Hayes will be located in Hydraulic Development Corpn.'s General Sales Offices, 50 Church St., New York City.

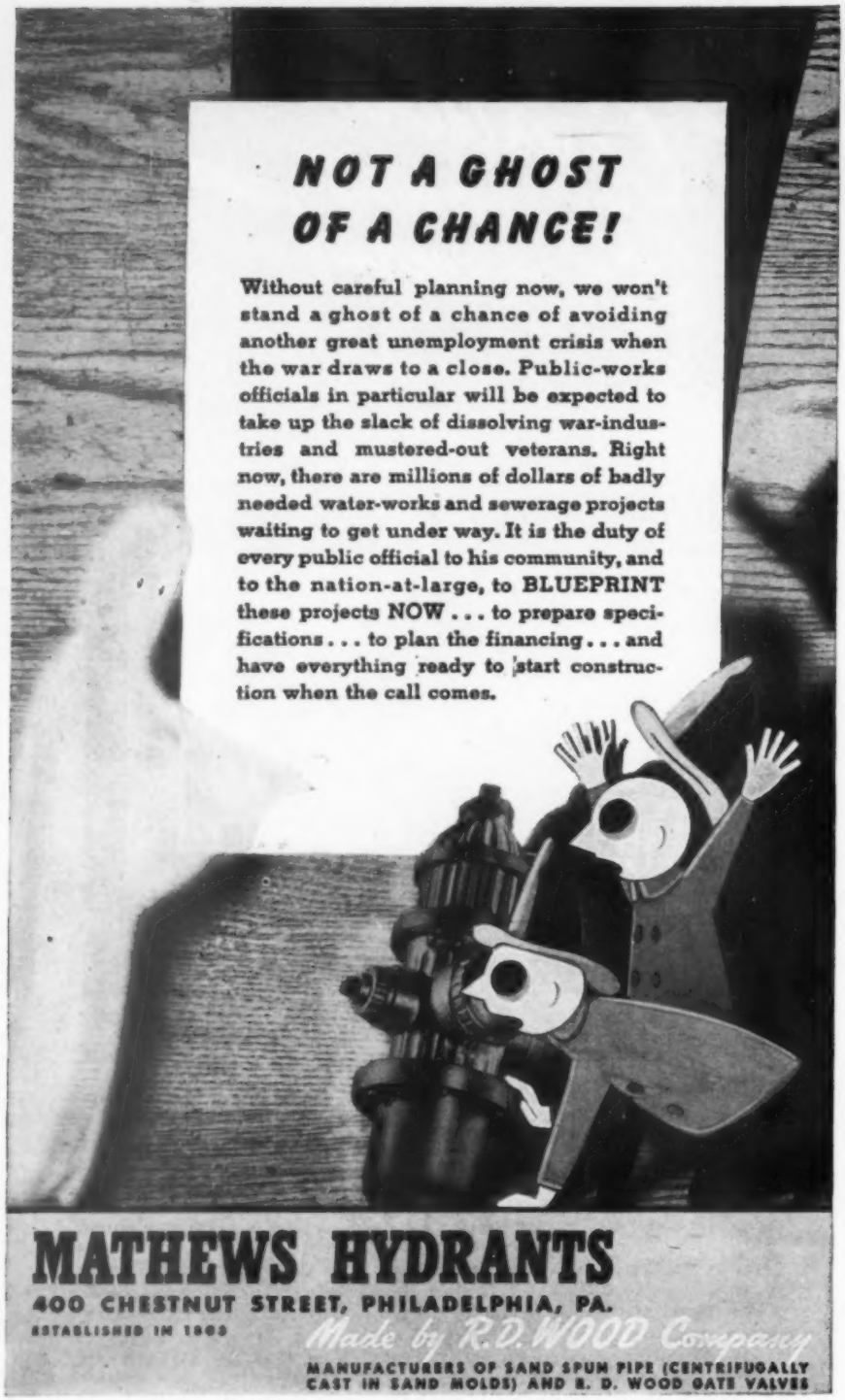
Clayton Pressure Reducing Valve
1" to 4" Sizes, Screwed Ends
2" to 16" Sizes, Flanged Ends

The Clayton Pressure Reducing Valve is a necessity on every line where discharge must be maintained with minimum fluctuation, regardless of varying pressure on the inlet side. This Clayton Valve reduces and regulates line pressure to any required delivery pressure. It closes automatically against line pressure in a smooth, positive manner, eliminating surges in delivery pressure and "shock" or "water hammer" on inlet lines. Its exclusive design makes it ideal for dead end service.

WRITE FOR ENGINEERING DATA
REPRESENTATIVES IN PRINCIPAL CITIES

VALVE DIVISION
CLAYTON
"Feather Touch" CONTROL

CLAYTON MANUFACTURING COMPANY, ALHAMBRA, CALIFORNIA


NOT A GHOST OF A CHANCE!
Without careful planning now, we won't stand a ghost of a chance of avoiding another great unemployment crisis when the war draws to a close. Public-works officials in particular will be expected to take up the slack of dissolving war-industries and mustered-out veterans. Right now, there are millions of dollars of badly needed water-works and sewerage projects waiting to get under way. It is the duty of every public official to his community, and to the nation-at-large, to BLUEPRINT these projects NOW . . . to prepare specifications . . . to plan the financing . . . and have everything ready to start construction when the call comes.
MATHEWS HYDRANTS
400 CHESTNUT STREET, PHILADELPHIA, PA.
ESTABLISHED IN 1903
Made by R.D. WOOD Company
MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

IMPROVED JOINTING COMPOUND
Tegul-
MINERALEAD
for Bell & Spigot Main

- Sulphur base; quick sealing, speeding laying and backfilling.
- 10 lb. ingot form, easily handled, stored and shipped. Impervious to rain. Cannot change composition.
- Makes permanently tight joints. Goes 3 to 5 times as far as lead, helping conserve a strategic war metal.
- For money-saving information, write

The ATLAS MINERAL Products Company of Pa.
Mertztown Pennsylvania

BAILEY METERS AND CONTROLLERS
FOR SEWAGE TREATMENT AND WATER SUPPLY . . .

● Venturi Tubes, Weirs, Flumes, Nozzles and other primary elements; Mechanically and Electrically operated Registers and Complete Automatic Control Systems.

BAILEY METER COMPANY
1072 IVANHOE ROAD ● CLEVELAND, O.
● Bailey Meter Co. Ltd., Montreal, Canada

Fairbanks-Morse Buys Pomona Pump

Becoming World's Largest Manufacturer of Turbine Pumps

Announcement has been made that, in a $4,000,000 transaction, Fairbanks, Morse & Co. has purchased the Pomona Pump Co., a division of Joshua Hendy Iron Works. The sale became effective as of Sept. 2.

All physical assets, patents and trade-marks of the Pomona and Westco pump lines were included in the transaction. The Pomona firm has plants in Pomona, Calif., and St. Louis. With acquisition of this line, Fairbanks-Morse becomes the world's largest manufacturer of turbine pumps.

No changes in personnel are contemplated and Arnold G. Brown, general sales manager of the Pomona company, becomes assistant manager of the Fairbanks-Morse Pump Division in charge of Pomona and Westco products. Distribution and sales will continue under Mr. Brown's direction. Hereafter the Pomona pumps will be known as the Fairbanks-Morse-Pomona line, and the Fairbanks-Morse-Westco line.

Roots-Connersville to Become a Dresser Industry

The Dresser Mfg. Co. has entered into an agreement with the International-Stacey Corp., of which the Roots-Connersville Blower Corp. is a subsidiary, whereby Dresser will acquire International-Stacey Corp. through an exchange of stock. If this agreement is approved by Dresser stockholders, at a special meeting to be held late in October, then and thereupon Roots-Connersville Blower Corp. will become "one of the Dresser Industries," although still retaining its separate corporate identity and the name Roots-Connersville Blower Corp.

Cunningham Joins Hays Mfg.

Takes Over Territory Formerly Covered by Lester Buzzard, Now Sales Manager

George A. Cunningham of Birmingham, Ala., has recently joined the Hays organization and will represent the Hays Mfg. Co. in Alabama, Georgia, Tennessee, Mississippi, and Louisiana. For the past sixteen ears he was with the Alabama Water Service Company in the capacity of Assistant Secretary and Treasurer, as well as Purchasing Agent.

Herman Peterson, who formerly

covered Louisiana and Western Tennessee, will confine his activities to Texas, Oklahoma, and Arkansas.

Lester L. Buzzard, new Sales Manager, formerly covered th Eastern Tennessee, Georgia, Alabama, and Mississippi territory which Cunningham will cover, with Western Tenn. and Louisiana added thereto.

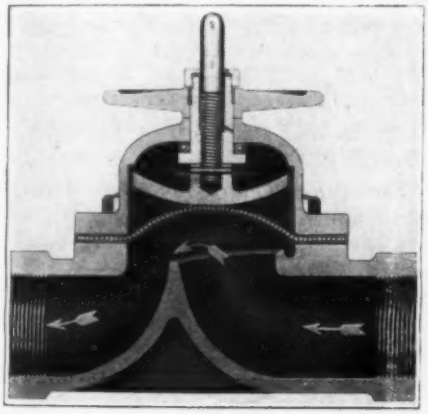
Marsh Elected Vice-Pres. by Kennedy Valve

The Kennedy Valve Mfg. Co., of Elmira, N. Y., has announced the election of Leon H. Marsh as Vice President and Sales Manager.

Mr. Marsh has been associated with the company for more than 25 years. After having been Assistant Sales Manager for many years, he was made Acting Sales Manager in 1941, upon the death of Clarence H. Kennedy, who had been the Company's Vice President and Sales Manager.

New McAlear Diaphragm Valve

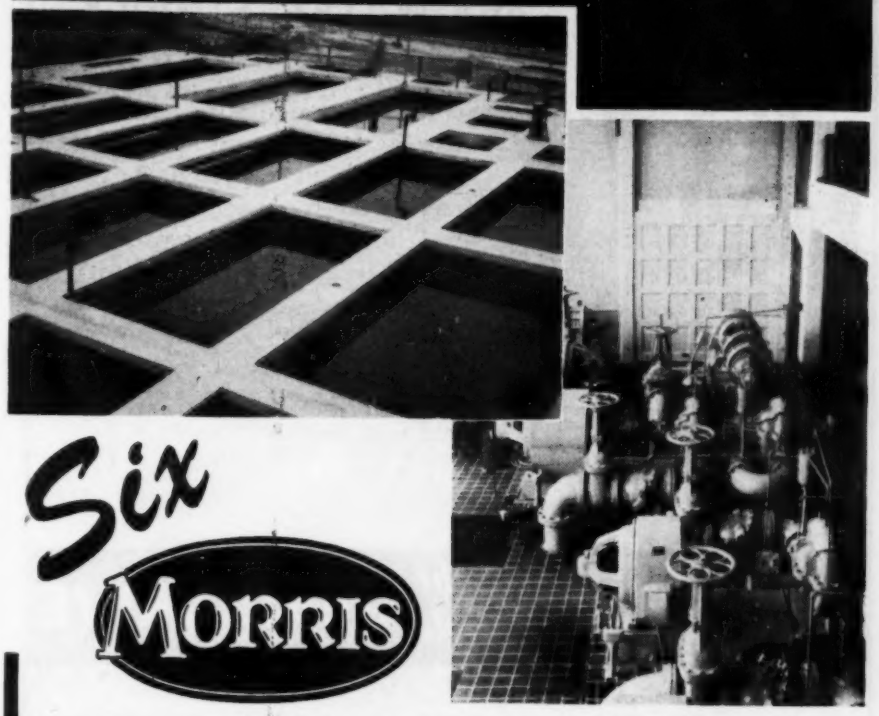
A practical valve for hard to handle liquids has been designed by the McAlear Valve Co. and will be introduced to the field in October. This



diagraph valve has the following advantages: positive shut-off insuring that solids trapped on the seat can not hold the valve open; no re-seating because the valve does not depend on metal to metal contact; no repacking because the diaphragm separates the fluid from the working parts; low maintenance; and leak-proof characteristics despite position of the valve.

In semi-steel or lined with rubber, glass, or lead this valve will handle many different acids, alkalies, abrasives and solids. Listed among the materials likely to be met in applications of the valve in water and sewage plants are water, lime slurry,

When War Tripled the Population of Fayetteville, N. C. . . .



Six MORRIS CENTRIFUGAL PUMPS

and a completely new water-treatment plant supplied the necessary 3,000,000 gallons daily

With its population swollen almost three times the peacetime normal, Fayetteville, N. C., rushed to completion a completely new, 3 MGD water-treatment plant.

Concession had to be made to wartime restrictions, but the heart of the new plant—its pumping system—went all out for reliability, economy and efficiency. Six direct-connected, double-suction MORRIS CENTRIFUGAL PUMPS of exceptionally rugged design were installed—selected on the basis of proved performance, low stresses, high efficiency under continuous operation, smoothness, quietness, reliability, and clean, trim lines.

Up to 8100 GPM

Capacity of the pumps ranged from 2100 GPM against a 190 ft. TDH to 8100 GPM against a 55 ft. TDH. Two pumps lift water from the impounding reservoir to the settling basins, three high-duty pumps distribute the water, and one wash water pump cleans the filter beds.

● Write now for complete facts on the types, capacities, horsepower and speeds of the pumps on this and other recent installations. Get specifications and prices on Morris Pumps to fit your particular needs—pumps with a 75-year record for efficiency, economy and dependability.

MORRIS MACHINE WORKS

Branch Offices in Principal Cities

BALDWINSVILLE, N. Y.

DEPENDABLE • EFFICIENT PUMPING FOR LOW COST

SEWAGE DISPOSAL and WATER SUPPLY

Scores of municipalities and industries throughout the country rely on the Johnson Right-Angle Gear Drive for use in pumping operations. This drive was designed as a "connecting unit" between the deep-well turbine or sewage pump and the power unit. Reduces shut-downs; gives 24 hour efficient service; lowers pumping costs.

JOHNSON *Right Angle* GEAR DRIVE

GET COMPLETE DETAILS

through the local representative of Pump and Engine Manufacturers. These drives are manufactured in a wide range of sizes to meet the specifications for most applications — Sewage Disposal; Water Supply; Fire Fighting; Flood Control, etc. Write for Catalogue No. 12.

★ DEPENDABLE
★ ALWAYS ON DUTY
★ LOW COST OPERATION
★ OCCUPYS LITTLE SPACE
★ FULLY ENCLOSED
★ UNUSUAL LONG LIFE

JOHNSON GEAR & MANUFACTURING CO., LTD.
MAIN OFFICE AND WORKS: BERKELEY, CALIFORNIA

BLEACHING POWDER
FOR WATER SANITATION

COPPERAS
SULPHATE OF IRON
FOR WATER PURIFICATION

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EMPIRE STATE BUILDING
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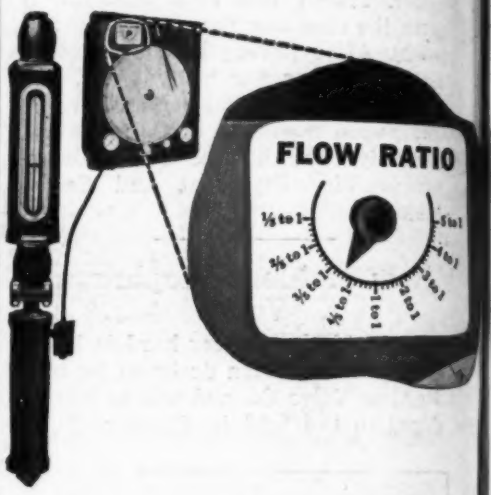
GAS • WATER • OIL
METERS
GAS PRESSURE
REGULATORS
NORDSTROM LUBRICATED PLUG
VALVES
Pittsburgh Equitable Meter Co.
Merco Nordstrom Valve Co.
Main Office and Works—PITTSBURGH, PA.

lime sludge, ferric chloride, filter alum, sewage sludge, and sea water. This No. 1455 diaphragm valve is described in a bulletin which may be obtained from the McAlear Manufacturing Co., 1949 So. Western Ave., Chicago 8, Ill.

New Rotameter Flow Ratio Controller

A new Fischer and Porter Rotamatic Ratio Flow Controller will automatically keep one of two flows at a fixed percentage of a second variable flow. The principle of operation is a combination of two rotameters placed on the respective flow streams, with electric transmissions for remote readings.

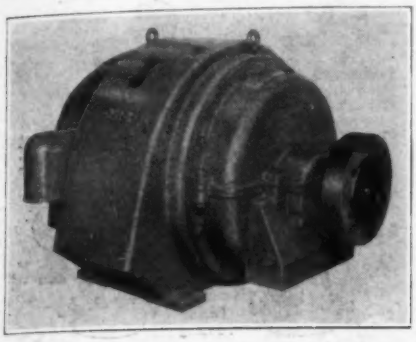


The remote flow-responsive balance beams from these two rotameters are placed back to back and connected by a cross beam. From the cross beam is suspended an arm whose position may be changed at will by sliding it on the beam. The suspension arm is connected to a "Rotamatic" air-operated control mechanism which in turn transmits air pressure to an air operated control mechanism, which in turn transmits air pressure to a valve in the flow line of the stream which is to be maintained at a fixed percentage of the main flow. The position of the arm suspended from the cross beam determines the ratio of the two and the ratio is readily maintained from 1/5 to one to five to one, just by moving the ratio index button. Liquid flows of from one to 6000 gpm may be proportioned.

Full details of this new Rotamatic Ratio Controller are given in Bulletin 50-A which may be obtained from Fischer & Porter Co., 954 County Line Road, Hatboro, Pa.

E-M Induction Motors

A new line of large, heavy-duty induction motors has been announced by Electric Machinery Mfg. Co., Minneapolis, for all types of industrial, power plant, water works, sewage plants and other drives. Motors range from 200 hp to 1000 hp,



and are available in squirrel cage and wound rotor models. Special electrical and mechanical modifications can be supplied to meet specific power service and motor application conditions. Write for publication 169, for further information on the motors of the Electric Machinery Mfg. Co., Minneapolis, Minn.

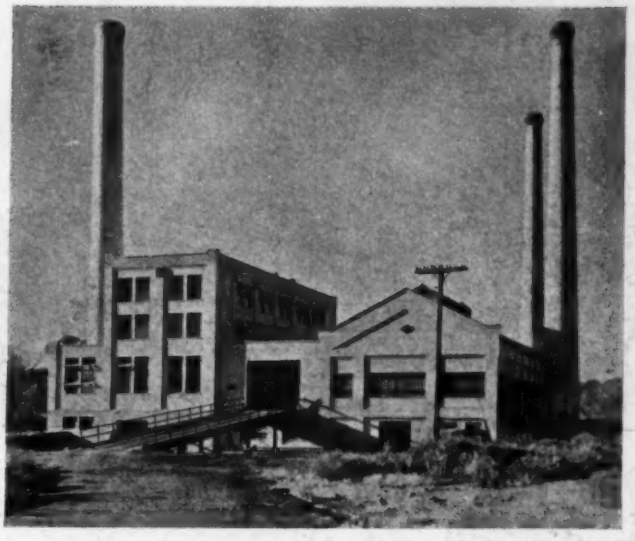
The Sterling Viking

A New Diesel Engine

The Sterling Engine Co. of Buffalo, N. Y., has announced a new line of Diesel engines for industrial applications, including water works and sewage disposal. To be known as the Sterling Viking with ranges from 250 to 650 hp, the new engines embody the latest features of Diesel engine design. The unit is very compact, being practically no larger than a gasoline engine to develop the same power. Four models are available with six and eight cylinders, depending on the power required. Fuel consumption is claimed to be exceptionally low, being about two thirds that of a gasoline engine of the same size and with a lower cost fuel as well.

HEAVY-DUTY INCINERATION

MORSE BOULGER DESTRUCTORS



Incineration plant at New Rochel'e, N. Y., where population increases necessitated two additions to the plant's original capacity. The Morse Boulger Destructor Co. handled the original plant and the additions.

Morse Boulger Incineration

A Good Investment

1 . . . in civic improvement

2 . . . in the proper handling of combustible wastes

It is not sufficient just to dump combustible wastes into a flaming furnace. Proper incineration takes the products down to ash with minimum fuel—without offensive odors—without smoke.

To the community interested in putting in incinerators which will reflect credit on the progressive plans of its public officials, Morse Boulger Engineers offer their 50 years of experience on the Incineration of Community Waste.

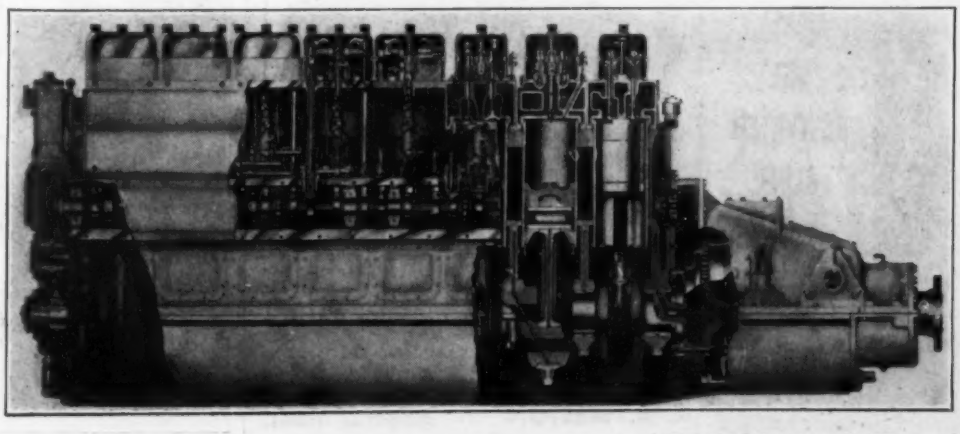
MORSE BOULGER DESTRUCTOR CO.

205-W EAST 42ND ST NEW YORK 17, N. Y.

Agents in Principal Cities

10-MB-4

The Sterling Viking



with REILLY PIPE ENAMEL

Reilly COAL TAR PRODUCTS

New booklet describing REILLY *Protective Coatings sent on request.*

17 PLANTS
to Serve the Nation

☆ REILLY Enamel gives complete and dependable protection to both the outside and inside surfaces of steel water mains. The outside surface is protected against corrosion from moisture, electrolysis, soil acids or alkalies, also against abrasion and soil stress. The inside of the pipe is protected against corrosion, incrustations and tuberculation. Water mains lined with Reilly Enamel can be depended upon for full-capacity flow for the life of the pipe.

Important water works projects on which Reilly Enamel has been used include: Metropolitan Water District of Southern Cal. (coating and lining large steel pipe which carries water from Colorado River to the Los Angeles district), New York City (reconditioning 72″ pipe), Chicago, Grand Rapids, Denver, Vinita Dam, Vinita, Okla. (penstocks), Toledo, Pensacola, Fla. (flood dam gates).

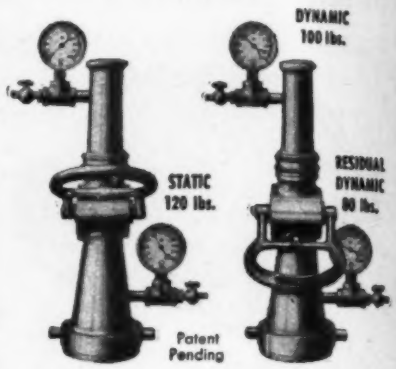
REILLY corrosion-resisting paints provide dependable and economical protection to tanks, standpipes, dam gates and other waterworks equipment.

REILLY TAR & CHEMICAL CORPORATION
Merchants Bank Building, Indianapolis 4, Ind.
500 Fifth Avenue, New York 18, N.Y. • 2513 S. Damen Avenue, Chicago 8, Ill.

Reilly Protective Coatings

"Dyna-Stat" Pressure Tester

A new device known as the Dyna-Stat Hydrostatic Dynamic Pressure Test Pipe has been developed by the Vulco-Products Co. to determine not only the static pressure in a pipe line



or hydrant, but also the all important dynamic pressure.

Dynamic pressure is the measure of power (impact) of a water stream in motion, and gives a true picture of how good or deficient the available water supply actually is in terms of flows and residual pressures during fire flows. This device is no cure for low pressures or faulty water supply service but it will indicate where faulty delivery at fire hydrant or other outlets exists. Further information on the "Dyna-Stat" may be obtained from the Vulco Products Co., 409 W. 36th St., New York 18, N. Y.

The "Aero-Titrator"

Determines Hardness Quickly and Accurately

The "Aero-Titrator" is a new piece of laboratory equipment oper-

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MONEY
USE
ACTIVATED
ALUM
and
BLACKALUM

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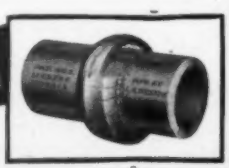
WESTON



GASKET AND FORM
The Perfected Method for Making
The PIPE JOINTS OF CEMENT

- No jute used—gasket centers spigot.
- Definite space in each joint for cement.
- Form confines cement-grout to lower portion of joint.
- Particularly advantageous in water-bearing trenches.
- Infiltration minimized.

L. A. WESTON **Adams, Mass.**

ating on an entirely new principle. With this device the chemist can quickly, easily, and accurately determine the hardness of a water. Able to reproduce results, the device depends on the determination of a foam-meter end point. Hand agitation is dispensed with, air being used to agitate the sample while the standard soap solution is being added to the device. A mercury valve maintains the proper amount of air and the end point is reached when the foam reaches the top of the container. False end points are absent and, until the hardness is completely titrated, the foam will not rise to the predetermined level. There is no waiting to ascertain if the foam will persist. The Aero-Titrator was invented, designed and developed by Ben Nessin, of the Mt. Prospect Laboratories in Brooklyn, N. Y. It is marketed by the Chief Chemical Corp., 55 West 42nd St., New York 18, N. Y.

H. K. Porter Buys Fort Pitt Steel Casting

H. K. Porter Co., Inc., of Pittsburgh has announced the purchase of the Fort Pitt Steel Casting Co. of McKeesport, Pa., manufacturers of pressure and alloy steel. The latter company founded in 1906, has been awarded the Maritime Commission pennant three times for outstanding production. Administration of the Fort Pitt Co. will continue under the direction of Fred Grotts, president. The acquisition of Fort Pitt brings to six the number of complete industrial plants operated by Porter in the manufacture of process equipment, locomotives, freight cars, pumps, and ordnance materials.

Martin Noack Dist. Mgr. Fibre Conduit Co.

James R. Connell, vice pres. and sales mgr. of Fibre Conduit Co., Orangeburg, N. Y., has announced the appointment of Martin Noack as district manager for the company on the west coast. Mr. Noack will direct sales of Orangeburg Fibre Conduit and Orangeburg Fibre Pipe from the San Francisco district office.

Foxboro Expands New England Sales Force

The Foxboro Co., manufacturers of instruments for measurement and control has announced the addition of Paul Torre to the staff of sales engineers in the New England Ter-

Constructing 66-in. reinforced concrete pipe sewer in Michigan Avenue, Chicago.

The Record Points to

Concrete Pipe

For Postwar Sewers

Scores of cities are now blueprinting their plans for extensive postwar concrete sewer construction.

These communities have chosen wisely because in the hands of trained engineers, concrete sewers provide minimum infiltration and leakage; maximum hydraulic capacity and the strength and durability to serve for generations at lowest annual cost.

Write for free literature to aid in planning concrete sewer construction.

PORTLAND CEMENT ASSOCIATION

Dept. 10-29, 33 W. Grand Ave., Chicago 10, Ill.

A national organization to improve and extend the uses of concrete ... through scientific research and engineering field work

BUY MORE WAR BONDS

MECHANICAL EQUIPMENT BY ROBERTS FILTER MFG. CO. DARBY, PENNA.

KNOWN AROUND THE WORLD AS THE SIGN OF EXCELLENCE IN WATER TREATMENT EQUIPMENT

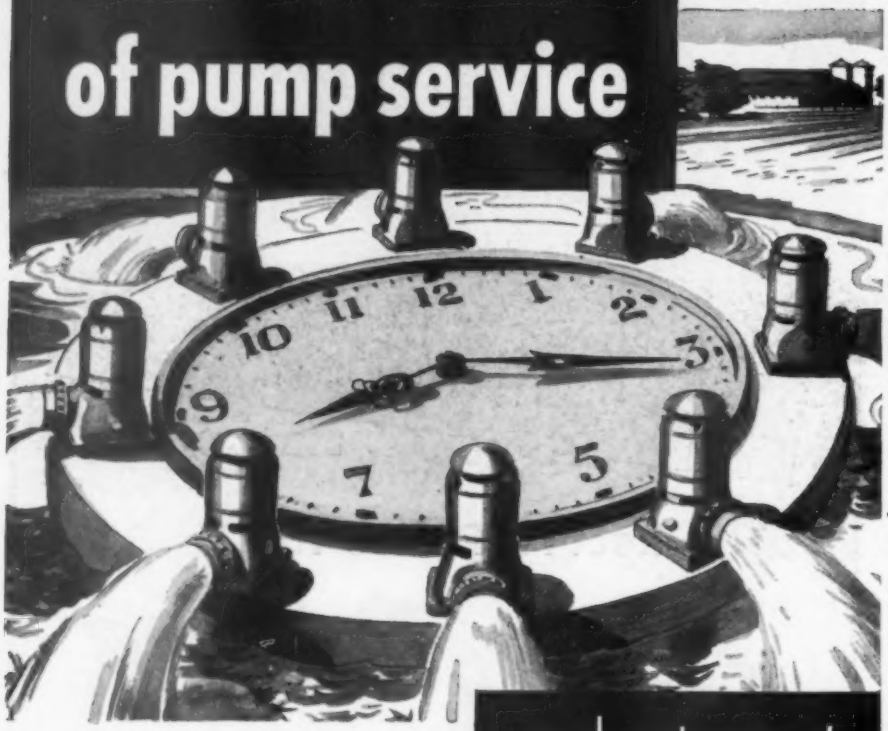
The years of experience behind the Roberts nameplate is your assurance that any water rectification problem is expertly handled to your best advantage. As manufacturing and installation engineers, the Roberts organization is equipped to meet your exact needs regardless of the size of the equipment or the complexity of the problem.

GRAVITY FILTERS • SOFTENING PLANTS AND EQUIPMENT • PRESSURE FILTERS ZEOLITE SOFTENERS • SWIMMING POOL RECIRCULATING APPARATUS SPECIAL WATER TREATMENT EQUIPMENT

We invite your inquiries

ROBERTS FILTER MANUFACTURING COMPANY • Darby, Pa.

20714 hours of pump service



and not a *cent* for repairs

Here is a typical Peerless performance record: A Peerless Deep Well Pump was installed January 29, 1939, in one of the "toughest" pumping locations in America. It was pulled June 2, 1944, to permit installation of another Peerless Pump of greater capacity. For almost 5½ years it was operated at an average of 10 hours daily, with a total of 20,714 hours of meritorious service. Never was a single cent spent on repairs. After pulling the pump, inspection revealed no appreciable wear. It has been installed in a near-by well and is expected to give years of additional service with little or no repair cost. This is the kind of service for which Peerless is noted—low cost of upkeep and unfailing dependability. Make Peerless your choice if economy is your objective.

PEERLESS PUMPS

PEERLESS PUMP DIVISION
FOOD MACHINERY CORPORATION

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INCINERATION ENGINEERS

NICHOLS ENGINEERING & RESEARCH CORPORATION

60 WALL TOWER NEW YORK, N. Y.

Consultants • Designers • Constructors

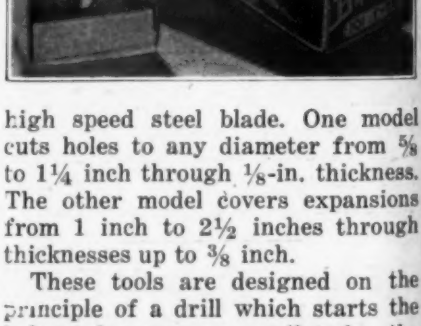
ritory. Mr. Torre has a background of nearly 25 years in technology and production control. His headquarters will be at the New England District office in Foxboro, Mass.

Wade Mfg. and Portland Iron Works Consolidate

Announcement has been made that the Wade Manufacturing Co. of Elgin, Ill., and the Portland Iron Works of Portland, Ore. have consolidated the manufacturing and distribution facilities of the two organizations. The former organization is well known for the Wade Wacor Water Hammer Arrester as well as back-water valves, etc.; the latter company is known as the maker of the Fleming drains. Stock will be maintained both on the west coast and in the middle west, eastern and southern states. The line of products, in complete range of sizes, will include floor drains, roof drains, grease interceptors, traps and cleanouts as well as the items mentioned above.

Bruno Adjustable Hole Cutters

A new all-purpose adjustable hole-cutting tool has been announced by Bruno Tools of Beverly Hills, Cal. Two sizes are available, each equipped with easily resharpened



high speed steel blade. One model cuts holes to any diameter from ⅝ to 1¼ inch through ⅛-in. thickness. The other model covers expansions from 1 inch to 2½ inches through thicknesses up to ⅜ inch.

These tools are designed on the principle of a drill which starts the hole and serves as a pilot for the tool, with a hardened body having a milled slot in which is set the specially ground steel tool bit. The tools are designed to operate in light drill presses, portable drills or

breast drills, and are also available with square shanks for hand brace use. For complete specifications, write to Bruno Tools, Beverly Hills, Cal.

Elgin Softener Representatives in New York and Jersey

Elgin Softener Corp., Elgin, Ill., manufacturers of water softeners, process water treating systems, and boiler water conditioning equipment have announced the appointment of B. M. Thompson, 8 E. 66th St., New York City, as Dist. Eng. in lower New York and upper New Jersey; and Orra F. Hawn, 7 Academy Road, Albany, N. Y., as Dist. Engr. in upper New York State.

Westinghouse Promotes Three

Three men on the staff of J. B. MacNeill, mgr. of the Switchgear and Control Div. of Westinghouse have received recent promotions. Maurice H. Hobbs, mgr. of Switchboard Engineering to manager of Engineering Dept. of the Division; Charles P. West, section engineer in Switchboard Engineering to manager of Switchboard Engineering; and Wilbur C. Fulton, switchboard engineer to section engineer in Switchboard Engineering. The men have been connected with the division since 1922, 1926, and 1928 respectively.

General American Process Equip. Div.

Offices were opened on May 1st, at 420 Lexington Avenue, New York, by the newly formed General American Process Equipment Division of the General American Transportation Corporation of Chicago, Ill.

Among the members of this new organization are Mr. H. M. Hunter, formerly Vice President and Manager of Sales, Mr. P. B. Sadler, Chemical Engineer, and Mr. G. D. Dickey, Manager of the Filter Department, of Goslin - Birmingham Mfg. Co., Inc., Birmingham, Ala.

These three gentlemen recently organized the Conkey Co. as successor to the Conkey Filter Company which itself was successor to Industrial Filtration Corporation and Moore Filter Company. The Conkey Company will devote its efforts to the filter and evaporator equipment line of the above division.

Companies comprising this new

SMITH HYDRANTS

THE A.P. SMITH MFG. CO. EAST ORANGE, N.J.

Symbol of Quality Since 1889

PROTECTOP

Trucks and motor cars back into fire hydrants every day. When this happens to a Smith Protectop Hydrant the break occurs at but one place and the only parts needing replacement are the frangible standpipe clamp and the frangible cast iron stem section. These parts cost comparatively little and full repairs can easily be made in 15 minutes. The valve is of the compression type and even should it be open at the time of the break, it will instantly close, preventing any possibility of flooding. Made in all sizes and types.

THE HYDRANT THAT CAN BREAK AT ONLY ONE PLACE

OTHER SMITH PRODUCTS
Valves and Hydrants — Valve Inserting Machines — Tapping Sleeves — Tapping Valves — Hat Flanges and Water Meters
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EDSON
DIAPHRAGM PUMPS
Hand Sizes 2", 2½", 3", 4"
Power Sizes 3" and 4"
Open Discharge or Force Pump
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A Filter Medium For All Purposes
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HILL-HUBBELL

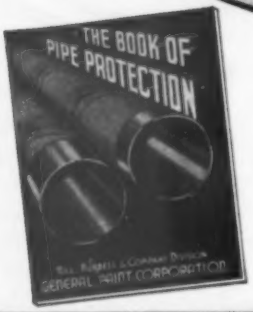
Steel Pipe Protection is GEARED to LINE PRO-TECTION

This illustration is good proof of the delivery of Line production HILL-HUBBELL Factory applied Steel Pipe Protection, ready for installation.

Beside the fact that MACHINE applied protection is applied to exact specification, under automatic thermostatic control and correct atmospheric conditions, our unit loading guarantee, backed by the American Railway Association, is your proven warranty of satisfactory delivery.

Discriminating engineers know the advantages of HILL-HUBBELL prepared pipe in cutting installation time.

Mail your request for your copy of The Book of Pipe Protection, TODAY.



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STEAM AND WATER TYPES

FOR DIGESTER HEATING

SEE DATA PAGE IN ANNUAL REFERENCE SECTION

AMERICAN RADIATOR & Standard Sanitary

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division include the Louisville Drying Machinery Co., the Conkey Company, the Turbo-Mixer Corporation and the American Machine Company.

LITERATURE AND CATALOGS

The M-Scope trio of devices essential in service maintenance by modern utilities are illustrated and briefly described in a mailing piece issued by the Joseph G. Pollard Co. of Brooklyn, N. Y. These three devices, the Electronic Box Locator, the Leak Detector, and the Pipe Finder are shown in their most familiar applications and a large number of utility service users are listed. A mailing card is included on which one can write to the Joseph G. Pollard Co., 142 Ashland Place, Brooklyn 1, N. Y., for information on any or all of these pieces of equipment.

The "Pneumatic Sponge" is the line of pumps described in a new bulletin (No. 44-7035) from the Byron Jackson Co. of Los Angeles. The "Pneumatic Sponge" pump is a novel pump designed for pumping heads up to 150 ft. in single stage, and 300 ft. in two stages. These pumps find a variety of uses for dewatering purposes where the pumped fluid contains a heavy percentage of solid material. Copies of Bull. 44-7035 may be had from the Byron Jackson–Co., P. O. Box 2017, Terminal Annex, Los Angeles, Cal.

Moretrench Wellpoint System—"The System for Working in the Dry" is presented in a 102-page bulletin and catalog which is divided into two parts. Part I shows typical construction projects where the Moretrench Wellpoint system has been effectively used. By means of actual photographs, short descriptions and diagrams, almost eighty pages show the application of these well points for the construction of everything from airport runways to water supply, wtih flood control, pumping stations and sewers included. Part II shows the items comprising the Moretrench Wellpoint System including fittings, mops, jetting chains, pumps and pump parts, etc. Also included is information on well point installation, savings, sales, rentals, and

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contracts, and on soil conditions. This bulletin on the Moretrench Wellpoint System may be obtained from the Moretrench Corp., 90 West St., New York 6, N. Y.

Scientific Sizing and Flow Control in Grease Interception, is described in Bull. A. I. A. No. 29C4 of the Josam Mfg. Co. of Cleveland. According to this bulletin, which has resulted from actual engineering experiments, the size of a grease interceptor does not depend on the fixtures to be served but on the rate of flow of waste water through the interceptor. Maximum rate of flow per minute is calculated to be 75 per cent of the cubical content in inches divided by 231. This rate of flow is kept constant in these interceptors by the introduction of flow control as described in the Bulletin which not only gives sizing data but also includes tables, blueprints, and other important information. Copies of this Bull. A. I. A. No. 29C4 may be obtained by writing to the Josam Manuf. Co., 301 Empire Bldg., Cleveland, O.

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This MUELLER-COLUMBIAN Flap Valve meets your severest tests. Heavy reinforcing ribs on gate and hinge provide added strength to withstand overloads. Fully bronze mounted. Bronze seat rings are accurately machined to prevent leaks. Sizes 4" to 24". May also be had with hub or spigot end. This is but one item in the big money-saving line of MUELLER-COLUMBIAN Water and Sewerage Control Equipment. Write for Catalog A300. Gives valuable data and full descriptions.

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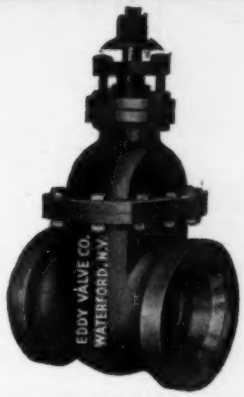

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Three Step Synchronous Motor Selection Guide is release No. A-32510 of the Westinghouse Editorial Service. This mimeographed article by K. M. Patterson, Motor Specialist, contains two figure charts which aid in the selection of those motors. Two examples of the application of the charts are given. For those interested the release No. A-32510 may be obtained from The Westinghouse Editorial Service, East Pittsburgh, Pa.

Correct Drill Pointing (3rd Ed.) is the title of a booklet of the Chicago-Latrobe Twist Drill Works. As the name implies the facts contained in the booket are helpful to correct the problems which may arise on the correct procedure for pointing twist drills for use on all types of materials. In addition to information on lip-clearance, point-angle, cutting edges, and point thinning, the twelve-page booklet shows drill points recommended for various materials and contains tables of cutting speeds. This handy and helpful booklet may be obtained by request to the Chicago-Latrobe Twist Drill Co., 411 W. Ontario St., Chicago, Ill.

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Flat Spray Nozzles are the subject of Bull. No. 459 of the Chain Belt Co. of Milwaukee. This new bulletin describes these effective spray nozzles which are used in practically all places in industry where cleaning, washing, and cooling operations take place. The folder not only illustrates the spray nozzles which come in various sizes and materials but it also describes them, giving tabular information concerning the discharge in gal. per min., dimensions, materials of construction, and sizes and prices. Bull. No. 459 may be had by writing to the Chain Belt Co., Milwaukee, Wis.

The Grove Flexo-Flo Remote Control Valve, Model 80 is described in a bulletin of the Grove Regulator Co. of Oakland, Cal. This 20-page bulletin discusses the simplicity of design of this remote control valve which employs just one moving non-metallic part. Operation of the valve is completely diagrammed and described, and diagrams are shown to explain the use of this valve for centralized control of valves, either hydra-pneumatic, externic, mechanical, or

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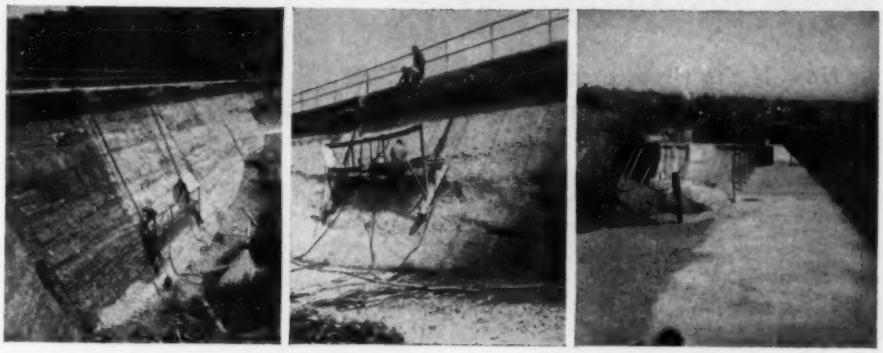

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This is the Brown's Falls Hydro dam of the Central New York Power Corporation, located in northern New York, a concrete structure that became badly eroded within a few years after completion. In 1935, we restored the up-stream side with reinforced "GUNITE," and in 1943 completed a similar job on the top and down-stream side. The photos show, successively, cleaning and chipping the old concrete for the later contract, setting the reinforcing mesh, and the completed work.

Our Bulletin 2200 describes similar jobs and many other uses for which "GUNITE" can be used advantageously. Write for a copy.

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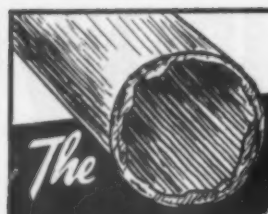

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electra-solonoid control. Each of these types of controls is shown in photograph and described. The Grove Flex-flo check valves for automatic control systems are also shown, and a flow capacity chart is included in this bulletin on the Flexo-Flo Remote Control Valve which may be obtained from the Grove Regulator Co., 1190 67th St., Oakland 8, Cal.

Amercoat Catalog is just off the press and contains information on Amercoat Plastic Coatings offered by the American Pipe and Construction Co. Containing sixteen pages, the catalog describes the many uses of Amercoat in a wide range of industries. Copies may be secured by writing Amercoat Div., American Pipe and Const. Co., P. O. Box 3428 Terminal Annex, Los Angeles 54, Cal.

Circuline Sludge Collector for Settling Tanks, as manufactured by Link-Belt Co., is described in book No. 1982 of that company. In this 24-page illustrated data book are photographs, dimensions, capacity tables, and other pertinent engineering data for both Type "A" and Type "B" Circuline collectors. Where average domestic sewage is treated, the new type "B" collector is recommended for tanks up to 55 ft. in diameter. Type "A" collectors in installations up to 115 ft. in diameter are also illustrated.

Among the features shown are the uniform influent distribution, positive, automatic scum removal from primary tanks, simplicity of drive, positive sludge collection and removal, and rubber tired wheels for easy travel. Also included in the bulletin are short descriptions with photographs of other Link-Belt sewage and water treatment plant equipment.

Book No. 1982 may be obtained from the Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia 40, Pa., or from any other Link-Belt office.

New Era in Flow Rate Measurement is a new, interesting, instructive catalog on the Fisher & Porter Rotameter, the area-type flow meter. This catalog, 10-B, contains 32 pages of the latest information on measuring flow rate of liquids and gases. Each basic advantage of the Rotameter is thoroughly discussed; how it works, its high accuracy, how it can be made immune to variations in viscosity and specific gravity. Large, semi-humorous illustrations dramatize each point to make it readily

understandable. A list of fluids successfully handled and some typical applications are included.

This complete catalog 10-B contains information invaluable to engineers with flow rate problems. A copy is readily obtainable, without obligation, by writing to Fischer & Porter Company, 954 County Line Road, Hatboro, Pa.

Apparatus and Chemicals for Water Analyses is the title of a new 44 page illustrated booklet, presenting the various apparatus and chemicals which are used for Industrial Water Analyses for plant control, has been issued by W. H. & L. D. Betz, of Philadelphia. The book features the test sets required for such determinations as hardness, alkalinity, phosphate, sulfate, dissolved oxygen, pH value, silica, and others. In addition, numerous comparators, photometers, turbidimeters and so forth are displayed.

The book "Apparatus and Chemicals for Water Analyses" is of interest to Plant Chemists, Power Plant Executives, Operating Engineers, and others who are interested in the conditioning of Industrial or Municipal water. It may be obtained from W. H. & L. D. Betz, Gillingham and Worth Sts., Philadelphia 24, Pa.

Hardcote Finishes, a product of McDougall-Butler of Buffalo, are described in a small folder and are presented in a 20 color shade card as well. These Hardcote finishes come in almost any color desired, dry in one hour, and have great resistance and durability. Primers are used with the finishes which have a plastic base of synthetic resins. Hardcote finishes are suitable for wood or metal, and make an ideal finish for factories, laboratories, chemical plants and institutions. They should find ample application in water and sewage plants inasmuch as their resistance factors (acid, alkali, moisture, and temperature) have been utilized to advantage in many industries. Write to McDougall-Butler Co., Inc., Buffalo, N. Y., for further information.

Farval Centralized Systems of Lubrication are presented in Bull. 25 of the Farval Corp., Cleveland. The instructive sixteen page booklet, printed in three colors, graphically portrays the theory and practice of mechanical lubrication and stresses the theme that centralized lubrication systems increase the productive output of machinery and save time, power, and lubricants. One cannot know too much about lubrication, and there is a selection of 24 applications photographs, in this bulletin which may be obtained from the Farval Corp., 3295 E. 80th St., Cleveland (4), Ohio.

Industrial Fractional Horsepower V-Belt Drives are manufactured by the B. F. Goodrich Co., of Akron, and are presented to the buying public in a 44 page handbook. Included in the bulletin are 27 pages of data in selection tables giving horse power and general engineering data. One chapter is devoted to proper selection of drives, with formulas. If you are interested, write the Industrial Products Div. of the B. F. Goodrich Co., Akron, O.

Engineering Papers — Fourth Annual Contest is a compilation of five sections of papers by members of the Hydraulic Institute. The subjects covered in the Engineering Pa-

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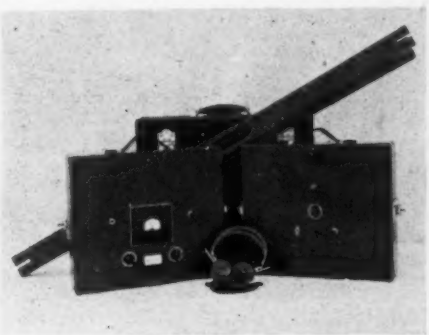

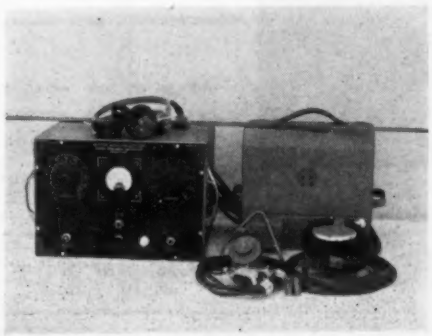

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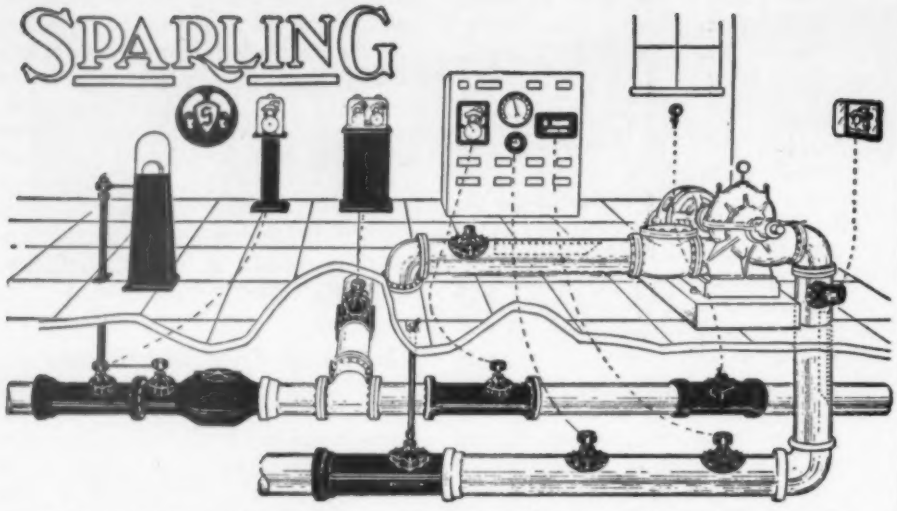

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pers are (1) Special operating conditions of centrifugal pumps, (2) A common language for hydraulic engineers, (3) Critical speed, (4) direct acting steam pumps, (5) Effect of entrained or dissolved gas on rotary pump performance. Copies of this publication may be obtained from the Hydraulic Institute, 90 W. Church St., New York 6, N. Y., for $1.50 plus postage.

Cleveland Speedaire Worm Gear Reduction Units, Bull. 300, of the Cleveland Worm and Gear Co., shows in detail and discusses the fan cooled type of worm gear reduction units. Sixteen pages of pictures, rating tables, dimension drawings, and information on installation make this bulletin of interest to anyone having a speed reduction problem. For Bull. No. 300, write The Cleveland Worm and Gear Co., 3301 E. 80th St., Cleveland 4, O.

Carbide Tipped Tools and **Spiral Fluted Chucking Reamers** are the titles of two small leaflets of the Chicago-Latrobe Twist Drill Works, of Chicago, Ill. The first gives information on carbide tipped reamers, both straight and taper shank. Included is a table of size of reamer, length, no. of flutes, and list price. The second folder gives the dimensions and list prices of high speed spiral fluted chucking reamers, either with tapered or straight shank. For either of these folders write to the Chicago-Latrobe Twist Drill Works, 411 W. Ontario St., Chicago 10, Ill.

Ventilation in all types of plants is possible with the Iron Lung Ventilator produced by the Powermatic Ventilator Co., Cleveland, Ohio. A four page folder describing this ventilator and its construction and application may be obtained from the company at 4019 Prospect Ave., Cleveland 3, Ohio.

Combustion Control is the subject of a catalog recently issued by Leeds and Northrup Co. to describe the new L & N system of combustion control, designed especially for smaller industrial or municipal power plants.

The catalog shows how the system regulates fuel-feed and draft by simple electrical balance, varying the settings of valves, dampers or vanes in definite proportion to steam demand. The application of the system to different types of boilers; stoker fired, pulverized coal fired, gas fired, and oil fired; is shown by schematic illustrations. Typical installations are pictured. For more complete in-

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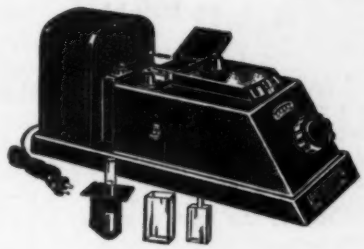

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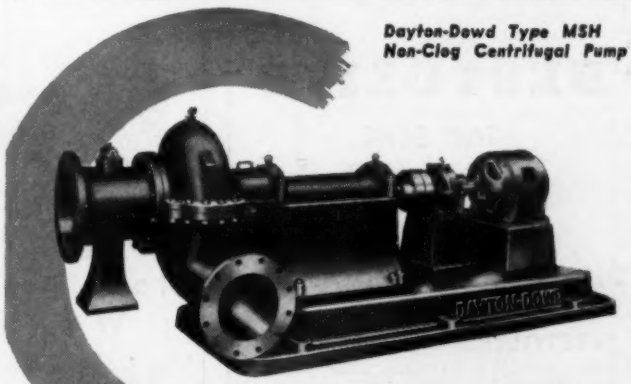

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formation about this system for the smaller steam power plant, and for pumping stations, write for Catalog N-01P-163, "L & N Combustion Control, Type P," Leeds and Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.

Alemite lubricating systems are described in four bulletins issued by the Alemite Division of Stewart-Warner Corp. of Chicago. The equipment described in these four bulletins is comprised of four centralized lubricating systems designed for application to small, medium, and large heavy duty machinery as well as to batteries of machinery. The four systems are Alemite LubroMeter, Progressive Lubricating System, Dual Progressive System, and the Dual Manifold System of Lubrication. Any or all of the bulletins will be sent free on request to Alemite Division, Stewart-Warner Corp., 1826 Diversey Parkway, Chicago, Ill.

Corrosion and Material Protection is the title of a one page sheet issued by Richard Rimbach, Consulting Engineer, of Pittsburgh, Pa. According to a box note in the first issue, "the purpose of issuing this publication . . . is to place before

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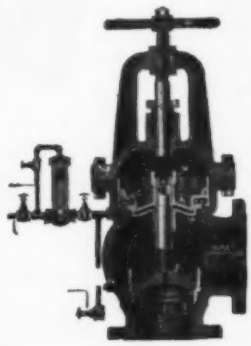

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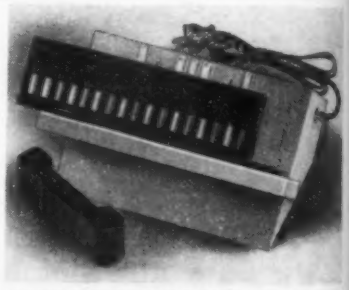

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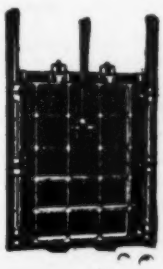

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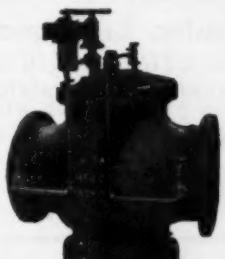

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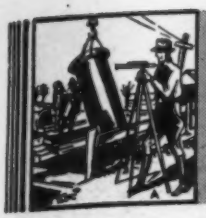

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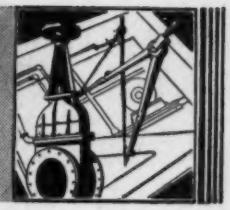

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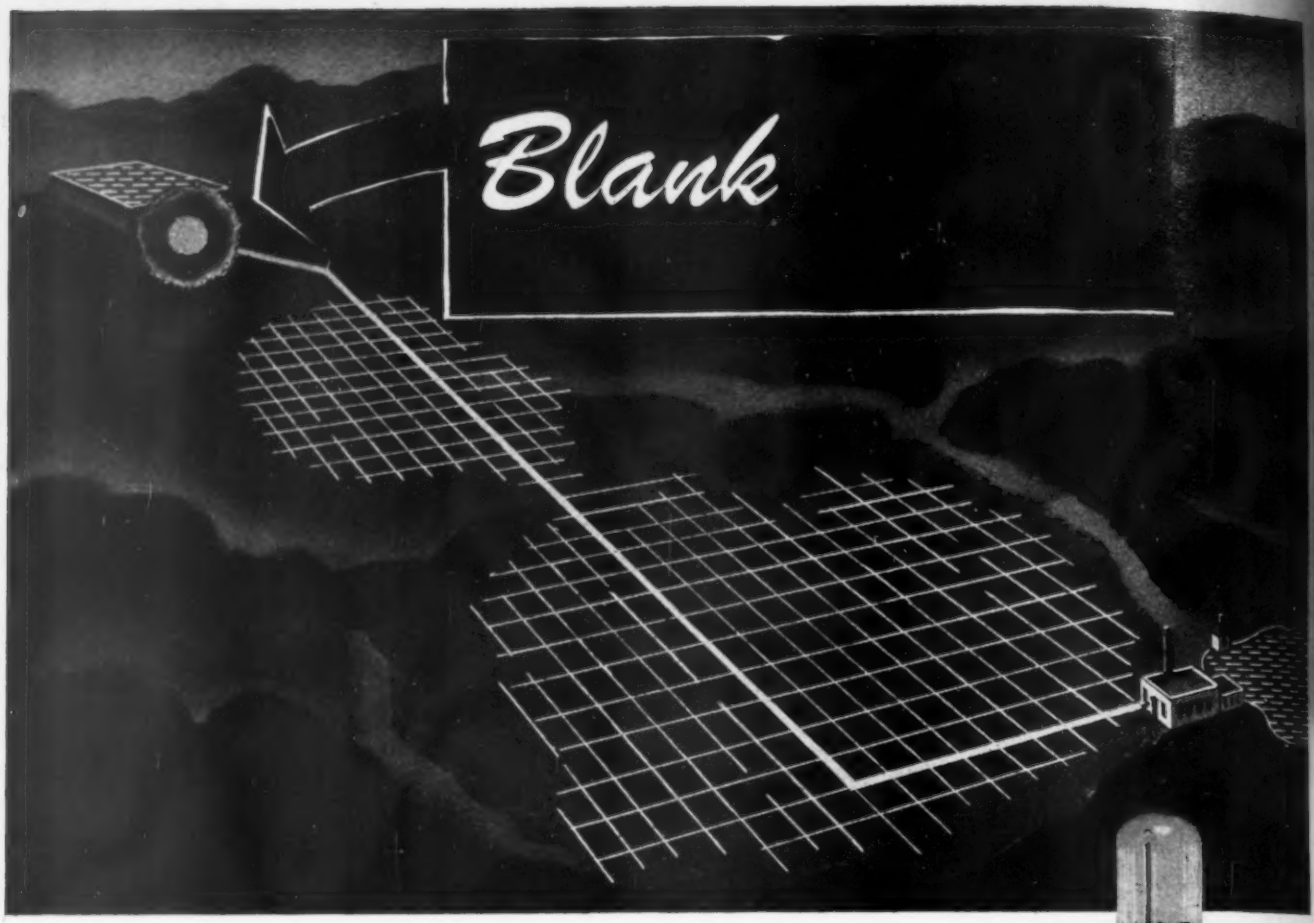

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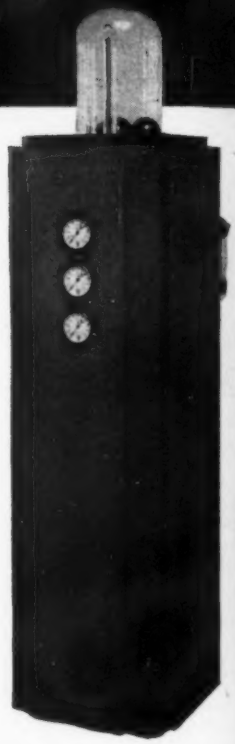

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